

*Feasibility Study  
Operable Unit 2  
Swan Island Upland Facility  
Portland, Oregon*

Prepared for:  
Port of Portland

January 2013  
1115-15



Ash Creek Associates  
A Division of Apex Companies, LLC





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## ***Abbreviations/Acronyms***

90UCL	90 <sup>th</sup> Percentile Upper Confidence Limit of the Mean
Ash Creek	Ash Creek Associates, Inc.
bgs	Below the Ground Surface
CGF	Coarse-Grained Flood Deposits
COIs	Chemicals of Interest
COPCs	Chemicals of Potential Concern
CRB	Columbia River Basalt
CSM	Conceptual Site Model
CT	Central Tendency
DEQ	Oregon Department of Environmental Quality
DTNA	Daimler Trucks North America
ECSI	Environmental Cleanup Site Information
ERA	Ecological Risk Assessment
FFA	Fine-Grained Facies of Flood Deposits
FS	Feasibility Study
HHRA	Human Health Risk Assessment
mg/kg	Milligram per Kilogram
OAR	Oregon Administrative Rule
OU2	Operable Unit 2
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
Port	Port of Portland
RBC	Risk-Based Concentration
RAO	Remedial Action Objective
RI	Remedial Investigation
RL	Remediation Level
RME	Reasonable Maximum Exposure
SIUF	Swan Island Upland Facility
SMP	Soil Management Plan
TPH	Total Petroleum Hydrocarbons



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## **1.0 Introduction**

This report presents the feasibility study (FS) for the Swan Island Upland Facility (SIUF; ECSI Site No. 271), Operable Unit 2 (OU2), Portland, Oregon. The FS is being performed as part of a Voluntary Agreement for Remedial Investigation, Source Control Measures, and Feasibility Study for the SIUF between the Port of Portland (Port) and the Oregon Department of Environmental Quality (DEQ), dated July 24, 2006.

### **1.1 Purpose and Scope**

The purpose of the FS was to evaluate remedial options and recommend a remedial alternative that addresses the unacceptable risk identified in the Baseline Human Health Risk Assessment (HHRA; Ash Creek, 2009a) in accordance with the requirements of DEQ rules and guidance. Consistent with the remedial investigation (RI), the scope of the FS was limited to the upland portion of OU2.

### **1.2 Report Organization**

The following is a brief overview of the organization of the report.

**Site Background.** Section 2 describes the location, the history, and a summary of previous environmental investigations for OU2.

**Conceptual Site Model.** The information from Section 2 is evaluated in Section 3, which summarizes the conceptual site model (CSM) for OU2. Also, information such as geology and hydrogeology, surface hydrology, and climate are described. This section includes a description of the nature and extent of the contaminants of concern, cleanup actions, and beneficial land and water use at OU2.

**Risk Assessment Summary.** Section 4 includes a summary of the human health risk assessment that was completed for OU2.

**Remedial Action Objectives and Remedial Action Area.** Section 5 defines and discusses the appropriate remedial action objectives (RAOs) for OU2 and the criteria by which potential remedial action alternatives will be evaluated. The extent of the area that contains media exceeding concentrations identified in the RAOs is described in Section 6.

**Technology Evaluation and Remedial Action Alternatives.** A list of general response actions are developed and presented in Section 7 to address the conditions encountered in the remedial action area described in Section 6. These general response actions form the basis for generating and screening technologies. Potential remedial technologies were developed for each general response action identified. Technologies were then evaluated with respect to specific site conditions, waste characteristics, and the



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ability to achieve the RAOs. The technologies remaining after the screening process were then combined to create potential alternatives for further detailed analysis.

**Detailed Analysis of Remedial Alternatives.** The potentially feasible remedial action alternatives are more fully developed in Section 8. The protective alternatives are evaluated on the basis of the balancing factors (effectiveness; long-term reliability; implementability; implementation risk; and reasonableness of cost) and the degree to which the alternative addresses removal or treatment of hot spots. The evaluation includes sufficient detail to identify comparative or relative differences among alternatives.

**Comparative Evaluation of Remedial Action Alternatives and Recommendation.** After completion of the detailed screening, the feasible remedial alternatives are ranked on the basis of a comparative analysis within the balancing factors in Section 9. Based on the results of the comparison rankings, a remedial action alternative is recommended. The recommended remedial action alternative is discussed in Section 10.

## **2.0 Background**

### **2.1 Site Location, Description, and History**

OU2 is a portion of the SIUF. The SIUF was previously referred to by DEQ as the “Swan Island Portland Ship Yard” and identified by DEQ as Environmental Cleanup Site Information (ECSI) Site 271. Figure 1 shows the location of the SIUF. Figure 2 shows the boundary of OU2. OU2 consists of approximately 24 acres of upland property at the SIUF and is owned by the Port. Prior to 2008, OU2 also included the paved parking area now designated as Operable Unit 4. OU2 was created to allow the Port to lease all or some of the property concerned to a new tenant. Specific details of site history are discussed in the Draft Supplemental Preliminary Assessment (Ash Creek, 2006) and RI/FS work plan (Bridgewater Group, 2000).

The Port acquired Swan Island in 1922. At that time, the main channel of the river was on the easterly side of the island, between the island and what is now Mocks Landing. Following the purchase, the navigation channel was relocated to the west side of the island. Shore areas on the island were excavated to form a new and wider channel to the southwest. The island’s surface elevation was raised with fill from excavation and dredging activities. A causeway was constructed to the southeast to connect the island to the shore, which created Swan Island Lagoon. Swan Island was then developed and served as the municipal airport for Portland from 1931 until it was relocated to the current location of Portland International Airport in 1940. The airport was used by private aviation tenants until 1942.

In 1942, the U.S. Maritime Commission entered into an agreement to lease approximately 250 acres of Swan Island from the Port. The Maritime Commission then contracted with Kaiser Company for the construction and operation of a shipbuilding yard on the island. Kaiser operated the shipyard until 1945. From 1945 until 1949, the shipyard was sub-leased by the United States to various tenants. In 1949, the



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Port purchased the shipyard assets from the United States and the shipyard served as a multi-user facility until 1996. In 1996, all shipyard management activities were assumed by Cascade General. The Port sold the shipyard to Cascade General in 2000.

OU2 has been used for relatively low-impact industrial activities throughout its history. A paved runway was present on OU2 during the period of operation of the municipal airport on Swan Island (1931 until 1942). From the 1940s to 1978, OU2 was primarily open land with railroad spurs used for materials receiving and storage. In 1978, the area was used to stage pre-cast concrete structures for construction of the ballast water treatment plant at Operable Unit 1. From 1985 until 1990, OU2 was used by the Atlantic Richfield Company to construct modular units for oil processing on Alaska's North Slope. After 1990, OU2 was used for materials and equipment storage in support of ship repair activities; sand, gravel, and rock storage; for a concrete batch plant; for storage and assembly of pieces of the Fremont Bridge; and for truck and trailer parking.

Currently, a portion of OU2 is leased to Daimler Trucks North American LLC (DTNA) for temporary staging of trucks and trailers, and a portion is leased to CEMEX for a concrete batch plant. The remainder of OU2 is vacant. The DTNA Leasehold covers approximately 7 acres at the southeast end of OU2. The CEMEX Leasehold includes approximately 12.1 acres in the central portion of OU2. Vacant areas include 2.7 acres of land along Berth 315 and the strip of land (2.4 acres) between the DTNA/CEMEX Leaseholds and the line of ordinary high water.

## 2.2 Remedial Investigation Summary

The RI for OU2 was comprised of multiple investigations conducted at the SIUF between 2000 and 2008. In addition, soil sampling was performed on the SIUF in 1998, prior to the RI. The following RI data collection activities and related reports were summarized in the HHRA (Ash Creek, 2009a):

- *Remedial Investigation/Feasibility Study Work Plan for the Portland Shipyard* (Bridgewater Group, 2000);
- *Phase IB Work Plan Addendum, Portland Shipyard Remedial Investigation* (Bridgewater Group, 2001);
- *Phase IB and II Soil and Groundwater Sampling Results, Portland Shipyard Remedial Investigation* (Bridgewater Group, 2002);
- *Operable Unit 2, Removal Action Report, Swan Island Upland Facility* (Bridgewater Group, 2006a);
- *Former Substation and Berth 305 Sampling Results Addendum, Swan Island Upland Facility* (Ash Creek, 2007);
- *Swan Island Upland Facility, Operable Unit 2 Supplemental Sampling Results* (Port, 2007a);
- *OU2 Riverbank Soil Sampling and Pipe Abandonment, Swan Island Upland Facility* (Ash Creek, 2009b);





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- *Swan Island Upland Facility, Operable Unit 2, Supplemental Groundwater Sampling Results* (Port, 2007b); and
  - *2007 Annual Groundwater Monitoring Results, Swan Island Upland Facility, Remedial Investigation* (Bridgewater Group, 2008).

Relevant data from the RI are included in the tables and figures in Appendix A.

## **2.3 Facility Cleanup Actions**

In 2005, a removal action was conducted at OU2 (Bridgewater Group, 2006a). The purpose of the removal action was to address soil with concentrations of arsenic that may constitute a Hot Spot. The elevated arsenic was likely associated with a thin, black layer of material observed near the surface during the removal action. A total of 297 tons of soil were excavated and disposed of in a licensed landfill. During the removal action, the soil at sampling locations B-28 (0 to 0.5 foot), RA2, RA3, S-48, S-49, and S-50 was removed (see Appendix A for sampling site plans). Subsequent sampling in September 2006 found that soils containing arsenic above the Hot Spot level were present to the east of the removal action area, at location S-54 (Port, 2007a).

## **2.4 Supplemental Surface Soil Sampling**

In July 2012, surface soil in DTNA leasehold area was sampled and analyzed for arsenic. The additional soil data were collected to better define the extent of surface soil impacts for evaluating the potential alternatives (e.g., capping versus removal) and to support final design of the selected remedy. Data from the sampling are included in Appendix A.

# **3.0 Conceptual Site Model**

The CSM presented in this section was developed from the results of the RI and related data collection activities summarized in Section 2.0. The *DRAFT Supplemental Preliminary Assessment* (Ash Creek, 2006) also provides specific details on the site history.

## **3.1 Geology and Hydrogeology**

### **3.1.1 Geology**

**Regional Geology.** The SIUF is located in the Portland Basin, a bowl-like structure bounded by folded and faulted uplands. The basin has been filled with up to 1,400 feet of alluvial and glacio-fluvial flood deposits. These sediments overlie older (Eocene and Miocene) rocks, including the Columbia River Basalt Group (CRB), Waverly Heights Basalt, and older marine sediments. Regional geologic units present beneath OU2 (from the ground surface downward) include Recent Fill (primarily dredged river sediment);



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fine-grained Pleistocene Flood Deposits and Recent Alluvium (undifferentiated); coarse-grained Pleistocene Flood Deposits (gravels); Upper Troutdale Formation; Lower Troutdale Formation/Sandy River Mudstone; and CRB.

**Local Geology.** Phase I and II investigations performed at the SIUF characterized geologic conditions to approximately 40 feet below the ground surface (bgs). The subsurface soils beneath the SIUF are mixtures of silt, sandy silt, silty sand, sand, and sand with gravel. In general, sand, and occasional gravel, is encountered to a depth of approximately 20 feet bgs. These materials represent the Willamette River dredged materials that were placed on Swan Island when it was reconfigured and raised in elevation in the 1920s. Underlying the fill is recent alluvium associated with the original Swan Island, consisting of variable mixtures of silt, sandy silt, silty sand, and sand. The land within OU2 is generally surfaced with crushed gravel to accommodate vehicle travel.

### **3.1.2 Hydrogeology**

**Regional Hydrogeology.** The major hydrogeologic units found in the area, proceeding from uppermost to lowermost, are Fill, Fine-grained Facies of Flood Deposits, and Recent Alluvium (FFA); Coarse-grained Flood Deposits and Upper Troutdale Formation (CGF); Lower Troutdale Formation/Sandy River Mudstone; and CRB. Of these, the FFA and CGF are the two hydrogeologic units that are relevant to the SIUF. The FFA ranges in thickness from 30 to 100 feet; it is the primary unit of importance in defining the interactions between upland groundwater and the river. The distribution of textures – and thus groundwater flow properties of the unit – varies both vertically and horizontally by location. Typical hydraulic conductivities can range over several orders of magnitude, depending upon whether the unit contains silt and clay, silty sand, or sand. The CGF has an overall thickness in the range of 100 feet. The CGF unit may act as a preferential groundwater flow pathway to deeper units and for deeper groundwater flow to the river where it is present adjacent to the river.

**Local Hydrogeology.** Shallow groundwater occurs under water table conditions at the SIUF. The depth to groundwater ranges from approximately 18 to 30 feet bgs. Shallow groundwater is recharged by the infiltration of precipitation that falls on Swan Island. Shallow groundwater discharges to the Willamette River and Swan Island Lagoon. Beneath OU2, the groundwater flow direction is expected to be southwesterly, toward the Willamette River.

Groundwater elevations near the shorelines of the Willamette River and Swan Island Lagoon fluctuate in response to diurnal tidal cycles and seasonal changes in Willamette River elevations. Groundwater monitoring performed between December 2001 and December 2005 found that groundwater elevations in wells installed near the shoreline fluctuated approximately 8 feet. Further inland, toward the middle of Swan Island, the response to changes in river elevations is less pronounced, with observed fluctuations of less than 1 foot.



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**Surface Water.** There are no surface waters on OU2. The Willamette River borders the southwest side of OU2 (see Figure 1). Precipitation falling on OU2 generally infiltrates. There is no stormwater system in the Berth 315 area. The concrete batch plant (CEMEX lease) has a stormwater collection system that is directed to an infiltration swale. There is one catch basin at the southeastern end of the DTNA lease that discharges to the Willamette River at outfall WR-163, but the majority of stormwater on the DTNA lease area infiltrates.

### **3.2 Nature and Extent of Contamination**

Based on historical reviews and investigations conducted at OU2, the chemicals of interest (COI) in soil and groundwater are total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), volatile organic compounds, phthalates, tributyltin, and metals. Except for metals and PAHs, the majority of samples analyzed for COI were at background concentrations or below detection limits. Metals and PAHs were most frequently detected in surface soil.

### **3.3 Beneficial Land and Water Use**

A land use evaluation and a beneficial water use evaluation were completed as part of the SIUF RI (Bridgewater Group, 2006b). Conclusions of the land and water use evaluations are summarized below.

The current and reasonably likely future land use for OU2 and the SIUF is industrial. The SIUF is currently zoned industrial and lies within the City of Portland Industrial Sanctuary and Swan Island Plan District. The SIUF is expected to continue to be used for industrial purposes, consistent with goals and policies stated in the City's Comprehensive Plan (City of Portland, 2004).

The only current and reasonably likely future beneficial groundwater use at the SIUF is discharge to surface water. Other beneficial uses of groundwater on the SIUF are unlikely because: a public water supply system already exists and is the source of water supply to all OUs; there is no trend toward groundwater being developed as a source of water supply in the area; the owners of properties that make up the SIUF have indicated that they have no plans for future use of groundwater; and the public water suppliers, including the City, have no plans to develop groundwater on or near the SIUF to meet future increases in water demand.

The Willamette River is adjacent to OU2. It is used mainly for habitat (e.g., anadromous and resident fish species), commercial/industrial activities (e.g., navigation), and recreational activities (e.g., boating, sport fishing). Also, local American Indian tribes have fishing rights on the lower Willamette River.

### **3.4 Chemicals of Potential Concern**

The RI for OU2 included chemical analysis of up to 97 soil samples and 14 groundwater samples. These data are of sufficient quality for use in a risk assessment. A screening of the chemical data was completed



to identify chemicals of potential concern (COPCs). In general, the screening process used assumptions about exposure and toxicity that are more conservative than used in the subsequent risk calculations. This approach assures that chemicals that may contribute small but significant portions to overall risk are not left out. Primary conservative approaches used for the COPC screening include:

- Residential screening levels for soil;
- Residential tap water screening levels for groundwater;
- Use of diesel screening level for residual petroleum hydrocarbons; and
- Use of all historical data, including data from soil removed during the 2006 removal action.

The COPC screening identified the following chemicals, detected at least once above screening levels in soil or groundwater:

COPC	Soil	Groundwater	Soil/Groundwater Combined
Diesel-range TPH	X		
Antimony	X		
Arsenic	X	X	
Chromium		X	
Copper			X
Lead	X	X	
Nickel		X	
Aroclor 1260	X		
Total PCBs	X		
Benzo(a)anthracene	X		
Benzo(b)fluoranthene	X		
Benzo(a)pyrene	X		
Indeno(1,2,3-cd)pyrene	X		
Dibenz(a,h)anthracene	X		
Benzo(g,h,i)perylene	X		
Vinyl Chloride		X	
Chloroform		X	

## **4.0 Summary of Baseline Risk Assessment**

### **4.1 Ecological Risk Assessment**

Level I Scoping (NewFields, 2006) and Level II Screening (Formation, 2012) Ecological Risk Assessments (ERAs) were completed for OU2. The Level I ERA concluded that except for limited areas on the riverbank, there are no ecologically important species or habitat present within OU2. The Level II Screening ERA showed that concentrations of copper (plants, invertebrates, birds, mammals), lead (birds), and zinc (plants, invertebrates, birds, mammals) exceed screening levels established by DEQ to prompt additional evaluation to support risk management decisions. Expanded Level II analysis and supplemental population-level probabilistic evaluations concluded that remediation at OU2 is not necessary based on ecological risk.



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## 4.2 Human Health Risk Assessment

The baseline HHRA for OU2 was completed in accordance with the RI/FS work plan (Bridgewater Group, 2000), the annotated risk assessment outline reviewed and approved by the DEQ, and relevant guidance. Under the baseline conditions, the results of the baseline HHRA are summarized as follows.

- For non-carcinogens, hazards for receptors and pathways evaluated met the acceptable hazard level.
- For carcinogens, receptors and pathways evaluated had excess lifetime cancer risks that met the acceptable risk levels in the CEMEX and vacant (Berth 315) areas.
- For carcinogens in the DTNA area, receptors and pathways evaluated had excess lifetime cancer risks that met the acceptable risk levels except for occupational and construction worker direct contact with soil containing arsenic. Estimated excess lifetime risks for these scenarios were:
  - Occupational Worker Exposure to Arsenic –  $2 \times 10^{-5}$  to  $3 \times 10^{-5}$  for central tendency (CT) and reasonable maximum exposure (RME), respectively; and
  - Construction Worker Exposure to Arsenic –  $3 \times 10^{-6}$  to  $6 \times 10^{-6}$  for CT and RME, respectively.

## 4.3 Hot Spot Evaluation

A Hot Spot may be present in soil if hazardous substances are present at unacceptable risk levels (OAR 340-122-0115(32)(b)) and are present at high concentrations, are highly mobile, or cannot be reliably contained (although the language of the Hot Spot statute in ORS 465.315(2)(b)(A) could be interpreted to mean that hazardous substances in high concentrations are only Hot Spots if they are also either highly mobile or cannot be reliably contained). Arsenic was the only substance present (in soil) at unacceptable risk levels. Arsenic in soil is not highly mobile and can be reliably contained. Therefore, a Hot Spot would be present only if arsenic is present at high concentrations, defined (for carcinogenic compounds) as 100 times the concentration corresponding to the acceptable risk level. The occupational risk-based concentration (RBC) for arsenic in soil is 1.7 milligrams per kilogram (mg/kg). Therefore, the Hot Spot concentration for arsenic in soil is 170 mg/kg. Two soil samples (S-54 and FS-26-1, with arsenic concentrations of 449 and 629 mg/kg, respectively) had concentrations above the Hot Spot concentration.

A Hot Spot may be present in groundwater only if there is an impact to beneficial use of groundwater. There are no impacts to beneficial use of groundwater at OU2, so there is no groundwater Hot Spot.

## **5.0 Remedial Action Objectives and Evaluation Criteria**

RAOs are medium-specific goals for protecting human health and the environment and provide the framework for developing and evaluating remedial action alternatives. RAOs were developed to address



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pathways that pose the potential for unacceptable risk and to remediate Hot Spots to the extent feasible. RAOs for the Site are presented below.

## 5.1 Remedial Action Objectives

The following RAOs have been identified for the Site.

- Reduce arsenic concentrations in soil or prevent receptors from exposure to concentrations of arsenic in soil in exceedance of the greater of the default background concentration or RBCs.
- Remove or treat Hot Spots in soil to the extent practicable as defined by DEQ rules.

Arsenic concentrations relevant to these RAOs are listed below.

Default Background	7 mg/kg	(DEQ, 2010)
Occupational RBC	1.7 mg/kg	(DEQ, 2003)
Construction Worker RBC	13 mg/kg	(DEQ, 2003)
Hot Spot Concentration	170 mg/kg	(see Section 4.3)

The controlling criteria for the RAOs are the default background concentration of 7 mg/kg and the Hot Spot concentration of 170 mg/kg.

Using the procedures from the risk assessment, a remediation level (RL) for arsenic was calculated for the DTNA area at OU2. In the risk assessment, the DTNA area was evaluated as a single exposure unit. The RL for the DTNA area was calculated as the cleanup level (concentration) for arsenic that would result in an exposure point concentration for the DTNA area equal to the default background concentration of 7 mg/kg. In general, the method used to calculate the RL was as follows:

- Beginning with the entire data set for the DTNA area (depth range of 0 to 3 feet), remove the maximum concentration sample from the data set and calculate the 90 percent Upper Confidence Limit of the mean (90UCL);
- Beginning with the resulting data set (with the prior maximum concentration removed), remove the new maximum concentration sample from the data set and calculate the 90UCL;
- Repeat these steps until the 90UCL is less than the default background concentration of 7 mg/kg;
- The maximum concentration corresponding to the data set where the 90UCL equals the default background concentration is the RL.

Table 1 summarizes the results of the RL calculations. Calculations of 90UCL values were completed using EPA's PROUCL calculation tool (EPA, 2010). Appendix B provides the input/output files for the 90UCL calculations. Using this approach, the RL for the DTNA area is 33 mg/kg arsenic.



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## 5.2 Evaluation Criteria

The evaluation of potentially feasible alternatives was based on the following criteria (OAR 340-122-085(4)).

### 5.2.1 Protectiveness

Protectiveness is a threshold requirement; only alternatives that meet the protectiveness requirements were evaluated (OAR 340-122-040). The protectiveness standards are:

- Ability of remedial action to protect present and future public health, safety, and welfare;
- Ability of remedial action to achieve acceptable risk levels specified in OAR 340-122-115;
- Ability of remedial action to prevent or minimize future releases and migration of hazardous substances in the environment; and
- Requirements for long-term monitoring, operation, maintenance, and review.

### 5.2.2 Balancing Factors

Balancing Factors include the following (OAR 340-122-090(3)):

- Effectiveness: Ability and timeframe of remedial action to achieve protection through eliminating or managing risk;
- Long-Term Reliability: Reliability of remedial action to eliminate or manage risk and associated uncertainties;
- Implementability: Ease or difficulty of implementing a remedial action considering technical, mechanical, and regulatory requirements;
- Implementation Risk: Potential impacts to workers, the community, and the environment during implementation; and
- Reasonableness of Costs: Considers capital costs, operations and maintenance, and periodic review, and includes a net present-value evaluation of the remedial action.

### 5.2.3 Treatment or Removal of Hot Spots

Hot Spots are evaluated based on the feasibility of treatment/removal of the Hot Spot using the above balancing factors with a higher threshold for cost reasonableness (OAR 340-122-085(5,6,7), -090(4)). The higher threshold is applied only as long as the Hot Spot exists.



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## **6.0 Remedial Action Area and Extent**

The extents of soil impacted by arsenic at concentrations that exceed the RL (33 mg/kg) and Hot Spot level (170 mg/kg) are shown on Figure 3. The extent was determined using sampling data from the RI (Bridgewater Group, 2001 and 2002), the removal action (Bridgewater Group 2006a), and supplemental surface soil sampling (Port, 2007a; Ash Creek, 2009b, 2011, and 2012). These data are presented in Appendix A.

The spatial characteristics of the remedial action area are summarized as follows:

- Soil Above the RL
  - Depth: Surface
  - Area: 49,000 square feet (5,500 square feet in the northern area)
  - Thickness: 1 foot
  - Volume: 1,800 cubic yards (200 cubic yards in the northern area)
  - Mass: 3,100 tons (350 tons in the northern area)
- Hot Spot Area (subset of the above area)
  - Depth: Surface
  - Area: 16,000 square feet
  - Thickness: 1 foot
  - Volume: 600 cubic yards
  - Mass: 1,000 tons

## **7.0 Remedial Action Alternatives and Preliminary Screening**

Initially, remedial actions associated with a list of general response actions were screened for applicability based on site and soil conditions and contaminant type. General response actions are broad categories of remedial measures that address the RAOs. A response action may be a stand-alone remedial action alternative or a component of a comprehensive alternative. The list of general response actions includes:

- No Action;
- Institutional/Engineering Controls;
- Removal;
- Containment;





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- *In Situ* Biological Treatment;
  - *In Situ* Physical/Chemical/Thermal Treatment;
  - *Ex Situ* Biological Treatment; and
  - *Ex Situ* Physical/Chemical/Thermal Treatment.

Table 2 lists the general response actions together with representative remedial action technologies for soil. Based on site use and type and extent of contaminants, these remedial action technologies were screened to identify a list of technologies to include in a more detailed evaluation of potential remedial action alternatives. The results of the screening are shown in Table 2, with the shaded technologies eliminated from further consideration. Comments on the table explain the rationale for eliminating technologies from further consideration.

Remedial action technologies for soil that remained following the initial screening include:

- No Action;
- Monitoring;
- Soil Management Plan;
- Dust Control;
- Personal Protective Gear;
- Soil Excavation and Off-Site Disposal;
- Capping; and
- Sieving.

As appropriate, technologies are combined to form functional alternatives. Monitoring, dust control, and use of personal protective gear are included with each active alternative. The No Action alternative is kept through the screening process to serve as a baseline for comparison. Based on the technologies remaining after the initial screening, the proposed alternatives for detailed analysis include the following:

- No Action;
- Excavation and Disposal;
- Excavate Hot Spot and Cap; and
- Cap.

These alternatives are evaluated in detail in Section 8.



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## **8.0 Detailed Analysis of Remedial Action Alternatives**

This section describes and evaluates each of the remedial action alternatives identified in Section 7. Feasibility of the alternatives was evaluated using the criteria in Section 5.2.

Following the evaluation, a comparative analysis of each alternative relative to the other alternatives was completed (Section 9). The comparative analysis serves as the basis for selecting the recommended remedial action alternative (Section 10).

### **8.1 No Action**

**Description.** According to OAR 340-122-085(2), a No Action alternative must be evaluated as a remedial action alternative. The No Action alternative assumes that no action is taken, no monitoring is performed, and no costs are incurred.

**Protectiveness.** The No Action alternative is not protective because it allows contaminants to be left in place at concentrations that exceed protective levels.

**Effectiveness.** The No Action alternative does not effectively manage or eliminate risk.

**Long-Term Reliability.** The No Action alternative is not reliable because it does not manage or eliminate risk.

**Implementability.** The No Action alternative is the easiest of the alternatives to implement.

**Implementation Risk.** Since there are no construction or remediation activities associated with the No Action alternative, there is no risk to workers or the public during implementation of this alternative.

**Reasonableness of Cost.** There is no cost associated with the No Action alternative.

### **8.2 Excavation and Disposal**

**Description.** For this alternative, soil with arsenic above the RL would be excavated for off-site disposal in a licensed landfill. Figure 4 shows the area of the soil excavation. It is assumed that the soil would not be a hazardous waste (would be verified during design/construction). The area of excavation includes the Hot Spot areas. The depth of excavation would be 1 foot. Confirmation sampling would be completed to verify removal of the soil above the RL and Hot Spot level. Following receipt of confirmation sample results, the excavation would backfilled with imported fill and/or the site would be re-graded using on-site material. Dust control and use of personal protective equipment are included in this alternative.



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The soil to be excavated consists of crushed rock over sand. Based on the boring logs for the surface soil sampling completed in 2012 (Ash Creek, 2012), the average depth of crushed rock in the area of the Hot Spot is 6 inches or less. Given the relatively small quantity of material, it is unlikely that sieving this material would be practicable. It is possible that the crushed rock could be passed through a sieve to separate the coarser gravel portion from the finer sand and silt. The gravel portion could then be returned to the site and only the finer fraction containing the arsenic would be removed. Assuming the crushed rock is consistent with State of Oregon standard specifications for ¾-inch-minus aggregate, approximately one-third of the material within the upper 1 foot could be removed by a ¼-inch sieve. Without further evaluation, it is uncertain if sieving could sufficiently separate the gravel and fines so that the gravel could be returned to the site. Sieving will be evaluated during design if excavation is selected. For the purpose of the FS, excavation will be evaluated both with and without sieving.

The total quantity of soil to be excavated for off-site disposal would be 1,800 cubic yards (3,100 tons) with one-third of that total being the Hot Spot. Approximately 600 cubic yards (1,000 tons) of the total may consist of gravel that could potentially be separated by sieving.

**Protectiveness.** Landfill disposal achieves protection by removing the contaminated soil to a managed facility. There are no long-term monitoring, operation, or maintenance requirements.

**Effectiveness.** This alternative is effective because the soil is removed off-site to a controlled landfill. The alternative is estimated to require two months to complete and it will be protective immediately after implementation.

**Long-Term Reliability.** Disposing of the soil at a landfill will eliminate the human health risk from the soil by removing the contaminant source to a managed facility. Landfill disposal does not reduce the toxicity or mobility of the contaminants. This alternative otherwise has good long-term reliability because the landfill is a controlled disposal facility that is required to conduct long-term maintenance and monitoring.

**Implementability.** This remedial action alternative is easy to implement. The work would use standard construction equipment. The excavation is shallow and the site is readily accessible. There are no structures inhibiting access to the soil. The area is used by a tenant to park trailers, so there would be some disruption to the tenant, but work could be scheduled to minimize impacts.

**Implementation Risk.** Risks that may be realized during implementation of this alternative include exposure to construction workers during the soil excavation (direct contact and inhalation of dust). These risks are readily addressed with engineering controls (e.g., dust suppression) and personal protective gear. There is a low risk of vehicle accidents during transport to the landfill area. Equipment and trucks used for the work would be diesel powered, contributing greenhouse gases to the atmosphere. The total quantity of diesel used would be proportional to the amount of material handled (ranging from a low of approximately



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3,000 tons assuming no backfill material is brought to the site to a high of approximately 6,000 tons for complete backfill).

**Reasonableness of Cost.** The estimated total cost range for this remedial action alternative is \$320,000 to \$360,000. Table 3 provides details and assumptions for the cost estimate. The cost includes design, permitting, construction, and contingency. There are no long-term costs associated with the excavation alternative. The cost range reflects the potential for cost savings by removing gravel using a sieve and returning the gravel to the site and potential savings associated with re-grading the site rather than importing gravel backfill.

**Treatment or Removal of Hot Spots.** This alternative addresses the Hot Spot by complete removal to a controlled landfill.

### **8.3 Excavate Hot Spot and Cap**

**Description.** For this alternative, soil with arsenic above the Hot Spot level would be excavated for off-site disposal in a licensed landfill. Figure 5 shows the area of the soil excavation. It is assumed that the soil would not be a hazardous waste (would be verified during design/construction). The depth of excavation would be 1 foot. The small separate area to the north is not a Hot Spot, but it is not practicable to separately cap that area. That area is included in the excavation/disposal. The total quantity of soil to be excavated for off-site disposal would be 800 cubic yards (1,350 tons). Confirmation sampling would be completed to verify removal of the soil above the Hot Spot level. Following receipt of confirmation sample results, the excavation would be backfilled with imported fill and/or the site would be re-graded using on-site material.

The soil to be excavated consists of crushed rock over sand. Based on the boring logs for the surface soil sampling completed in 2012 (Ash Creek, 2012), the average depth of crushed rock in the Hot Spot area is 6 inches or less. Given the relatively small quantity of material, it is unlikely that sieving the excavated soil will be practicable. For the purpose of the FS, it was assumed that sieving would not be conducted for the Hot Spot soil.

The remainder of the area exceeding the RL would be managed with an engineered cap to prevent direct contact. Figure 5 shows the proposed cap area. A representative cap section was selected consisting of 3 inches of asphalt concrete pavement over 6 inches of imported base rock. The cap would cover a total area of approximately 53,000 square feet or 5,900 square yards. Six inches of base rock over that area corresponds to a total of 1,700 tons of base rock. Dust control and use of personal protective equipment are included in this alternative.



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The cap would require annual inspections and maintenance as needed. Typical maintenance activities include filling cracks (assume every 5 years), seal-coat (assume every 10 years), and overlaying with new asphalt concrete (assume every 20 years).

Some of the soil remaining on site would have arsenic concentrations exceeding the RBC for construction workers. Institutional and engineering controls – including a soil management plan (SMP), dust control during construction work, appropriate worker training, and personal protective gear – would be used by future workers doing construction work within the footprint of the cap.

Capped areas could be redeveloped in the future if desired as long as the development is constructed and maintained to act as a cap for remaining soil containing arsenic above the RBCs. Redevelopment activities would be documented and appended to the SMP.

**Protectiveness.** Landfill disposal of the Hot Spot soil achieves protection by removing the contaminated soil to a managed facility. The cap alternative is protective of human health by preventing direct contact with the soil for occupational workers. An SMP will be incorporated into the alternative to address risks associated with construction worker exposure in the remedial action areas and to address long-term requirements for inspection and maintenance of the caps. Future construction workers would be protected through use of personal protective equipment.

**Effectiveness.** The off-site disposal portion of the remedy is effective because the soil is removed to a controlled landfill. In a controlled area such as OU2, capping is an effective means of managing risk to occupational workers. Risk to construction workers is addressed through training and personal protective equipment. These technologies are effective when properly implemented but rely on good communication and personal responsibility. The alternative is estimated to require two months to complete and it will be protective immediately after implementation.

**Long-Term Reliability.** This alternative does not reduce the toxicity or mobility of the contaminants. The long-term reliability of this alternative requires maintenance of the caps and enforcement of the SMP.

**Implementability.** This remedial action alternative is easy to implement. The work would use standard construction equipment. The excavation is shallow and the site is readily accessible. There are no structures inhibiting access to the soil. The area is used by a tenant to park trailers, so there would be some disruption to the tenant, but work could be scheduled to minimize impacts.

**Implementation Risk.** Risks that may be realized during implementation of this alternative include exposure to construction workers during excavation and cap placement (direct contact and inhalation of dust). These risks are readily addressed with engineering controls (e.g., dust suppression) and personal protective gear. There is a low risk of vehicle accidents during transport to the landfill area. Equipment and trucks used for the work would be diesel powered, contributing greenhouse gases to the atmosphere. The



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total quantity of diesel used would be proportional to the amount of material handled (approximately 4,000 tons) plus the fuel needed to manufacture the asphalt concrete.

**Reasonableness of Cost.** The estimated total cost for this remedial action alternative is \$620,000. Table 4 provides details and assumptions for the cost estimate. The cost includes design, permitting, construction, long-term inspection and maintenance, and contingency.

**Treatment or Removal of Hot Spots.** This alternative addresses the Hot Spot by complete removal to a controlled landfill.

## 8.4 Cap

**Description.** For this alternative, the risk associated with arsenic in the soil would be managed with an engineered cap to prevent direct contact. Figure 6 shows the proposed cap area. A representative cap section was selected consisting of 3 inches of asphalt concrete pavement over 6 inches of imported base rock. The cap would cover a total area of approximately 65,000 square feet or 7,200 square yards. Six inches of base rock over that area corresponds to a total of 2,000 tons of base rock. Dust control and use of person protective equipment are included in this alternative.

The cap will require annual inspections and maintenance as needed. Typical maintenance activities include filling cracks, re-coating approximately every 5 to 10 years, and overlaying with new asphalt concrete every 15 to 20 years.

Some of the soil remaining on-site would have arsenic concentrations exceeding the RBC for construction workers. Institutional and engineering controls – including an SMP, dust control during construction work, appropriate worker training, and personal protective gear – would be used by future workers doing construction work within the footprint of the cap.

Capped areas could be redeveloped in the future if desired as long as the development is constructed and maintained to act as a cap for remaining soil containing arsenic above the RBCs. Redevelopment activities would be documented and appended to the SMP.

**Protectiveness.** The cap alternative is protective of human health by preventing direct contact with the soil for occupational workers. An SMP will be incorporated into the alternative to address risks associated with construction worker exposure in the remedial action areas and to address long-term requirements for inspection and maintenance of the caps. Future construction workers would be protected through use of personal protective equipment.

**Effectiveness.** In a controlled area such as OU2, capping is an effective means of managing risk to occupational workers. Risk to construction workers is addressed through training and personal protective



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equipment. These technologies are effective when properly implemented but rely on good communication and personal responsibility. The alternative is estimated to require two months to complete and it will be protective immediately after implementation.

**Long-Term Reliability.** This alternative does not reduce the toxicity or mobility of the contaminants. The long-term reliability of this alternative requires maintenance of the caps and enforcement of the SMP.

**Implementability.** This remedial action alternative is easy to implement. The work would use standard construction equipment. The site is readily accessible. There are no structures inhibiting access to the soil. The area is used by a tenant to park trailers, so there would be some disruption to the tenant, but work could be scheduled to minimize impacts.

**Implementation Risk.** Risks that may be realized during implementation of this alternative include exposure to construction workers during cap placement (direct contact and inhalation of dust). These risks are readily addressed with engineering controls (e.g., dust suppression) and personal protective gear. Equipment and trucks used for the work would be diesel powered, contributing greenhouse gases to the atmosphere. The total quantity of diesel used would be proportional to the amount of material handled (approximately 3,100 tons) plus the fuel needed to manufacture the asphalt concrete.

**Reasonableness of Cost.** The estimated total cost for this remedial action alternative is \$570,000. Table 5 provides details and assumptions for the cost estimate. The cost includes design, permitting, construction, long-term inspection and maintenance, and contingency.

**Treatment or Removal of Hot Spots.** This alternative does not treat or remove the Hot Spot.

## **9.0 Comparative Evaluation of Remedial Action Alternatives**

This section of the FS presents an evaluation of the remedial action alternatives relative to one another. The comparative analysis is summarized in Table 6. In the table, each alternative is compared to each of the other alternatives for each evaluation criterion. An alternative is ranked as favorable (+), equal (0), or unfavorable (-) in relation to every other alternative. The scores are summed at the right of the table for each alternative and the alternatives are ranked. The following discussion provides the rationale for the comparative evaluation presented in Table 6.

### **9.1 Protectiveness**

This criterion is pass/fail. An alternative must be protective as defined by OAR 340-122-040 to be acceptable. With the exception of the No Action alternative, each of the remedial action alternatives is



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protective of human health. The alternatives were not scored based on this criterion, but protectiveness was considered when ranking the alternatives in the right-hand column.

## **9.2 Effectiveness**

The alternatives were ranked based on effectiveness of the alternative and the time required to complete the remedial action. The Excavation/Disposal alternative ranked higher than either capping alternative because the effectiveness for construction workers for the capping alternatives relies on implementation of an SMP. The Hot Spot Removal/Cap alternative ranked higher than the Cap alternative because the higher concentration soils are removed from the site. The No Action alternative was not considered an effective remedial alternative.

## **9.3 Long-Term Reliability**

The Excavation/Disposal alternative is considered more permanent and reliable than the either capping alternative in the long term because the contaminated soil from the excavation areas is removed to a controlled facility. The Hot Spot Removal/Cap alternative ranked higher than the Cap alternative because the higher concentration soils are removed to a controlled landfill. The No Action alternative was not considered a reliable remedial alternative.

## **9.4 Implementability**

The No Action alternative was considered the most easily implemented remedial action. The remaining alternatives are equally implementable as they use similar equipment and would have similar disruptions to tenant activities.

## **9.5 Implementation Risk**

The No Action alternative carries no implementation risk. The Cap alternative ranks next because it has the least amount of hauling over roadways and likely generates the least greenhouse gases. For these same reasons, the Hot Spot Removal/Cap alternative ranks next and the excavation alternative ranks last.

## **9.6 Reasonableness of Cost**

Cost estimates were developed for each of the remedial options based on capital and long-term costs. The following list summarizes the present-worth total cost estimates for each alternative.

- No Action (\$0);
- Excavation and Disposal (\$320,000 to \$360,000);
- Cap (\$570,000); and
- Hot Spot Removal/Cap (\$620,000).





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## 9.7 Treatment or Removal of Hot Spots

As discussed in Section 5.2.3, Hot Spots are evaluated based on the feasibility of treatment/removal of the Hot Spot using the balancing factors with a higher threshold for cost reasonableness. For the active alternatives, the two alternatives involving excavation remove the entire Hot Spot to a controlled landfill. The Excavation alternative has a lower cost and therefore does not require further evaluation. The Cap alternative does not remove or treat the Hot Spot. The Hot Spot Removal/Cap alternative, when considering all of the balancing factors, ranks the same as the Cap alternative. In the limiting case, “a higher threshold for cost reasonableness” would give zero weight to the cost factor. Re-scoring these two alternatives in Table 6 without the cost factor, the Hot Spot Removal/Cap alternative ranks higher than the Cap alternative. In terms of absolute costs, the Hot Spot Removal/Cap alternative is approximately \$50,000 greater in cost than the Cap alternative (or approximately 10 percent greater than the Cap cost). Furthermore, the Cap cost does not consider potential future cost impacts associated with contaminated soil under a re-development scenario. Considering all of these factors, the additional cost to remove the Hot Spot is proportionate to the benefits gained.

## **10.0 Recommendation**

### **10.1 Recommended Remedial Action Alternative: Excavation and Disposal**

Based on the evaluation of remedial action alternatives in Section 9, the recommended remedial action alternative for the SIUF OU2 is Excavation and Off-Site Disposal. This alternative is recommended for the following reasons.

- The Excavation alternative is protective of human health and the environment by removing soil to a controlled landfill.
- The Excavation alternative overall ranks the highest when considering the balancing factors with equal weighting.
- Although the Excavation alternative was the lowest ranked alternative for implementation risk, the absolute magnitude of implementation risk is low. Additionally, the alternatives have similar implementability. Therefore, when considering the balancing factors weighted for relative importance, the Excavation alternative ranks highest in both effectiveness and long-term reliability.
- The Excavation alternative removes the Hot Spot to a controlled landfill at the lowest cost among the active alternatives.



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## **10.2 Permit or Permit Exemption Requirements**

The recommended alternative consists primarily of excavation and filling of greater than 50 cubic yards of soil. A grading permit (or permit exemption) from the City of Portland will be required to complete the work. No other permits are anticipated to be required.

## **10.3 Residual Risk Assessment**

Upon completion of the Excavation alternative, soil containing arsenic above 33 mg/kg will be permanently removed from OU2. As discussed in Section 5.1 and Appendix B, this will result in the overall surface soil concentration at OU2 equal to the default background concentration of arsenic of 7 mg/kg. Therefore, the residual risk will be acceptable. There is no requirement for on-site management of unacceptable residuals.



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## **11.0 References**

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Table 1  
Remedial Action Level Calculation  
Feasibility Study  
Swan Island Upland Facility Operable Unit 2

Maximum Arsenic Concentration in Dataset (mg/kg)	90UCL (mg/kg)
629	37.7
449	26.4
136	14.0
122	12.4
96	11.4
92	10.4
58	9.5
50	9.0
43	8.5
41	8.0
40	7.9
39	7.6
37	7.2
29	6.8
27	6.6
25	6.4
24.6	6.2
24	6.0



RL = 33 mg/kg at 90UCL  
= 7.0 mg/kg

Notes:

- 1) See Appendix B for input/output information
- 2) Remediation Level (RL) corresponds to maximum arsenic concentration when 90UCL equal to 7.0 mg/kg.

Table 2  
Initial Screening and Evaluation of Technologies for Soil  
Swan Island Upland Facility Operable Unit 2  
Portland, Oregon

General Response Action	Technology	Description	Evaluation Criteria					Screening Comments
			Protectiveness/ Short-Term Effectiveness	Permanence/ Long-Term Effectiveness	Costs	Implementability	Management of Short-Term Risks	
NO ACTION	None	No Action.	--	--	++	++	++	Is not effective, but is retained in accordance with FS rules and guidance as baseline for comparison.
INSTITUTIONAL/ ENGINEERING CONTROLS	Access Restriction	Restrict access with physical, legal, and/or procedural barriers to prevent or control contact with contaminated soil. Examples include controlling site access to authorized personnel or implementing a Soil Management Plan.	+	-	++	--	++	Potentially effective. Has low cost and little or no risks to the public or workers during implementation. However, the property is intended to be actively used for industrial purposes, so these technologies would need to be used in conjunction with other technologies.
	Dust Control	Using water,organic palliatives, or temporary caps to prevent dust.	+	--	++	+	+	Potentially effective. Has low cost and little or no risks to the public or workers during implementation. This technology would need to be used in conjunction with other technologies.
	Personal protective gear	Gloves, clothing, and/or respirators used to prevent exposure to soil during construction activities.	++	--	++	++	++	Potentially effective. Has low cost and protects workers during implementation. This technology would need to be used in conjunction with other technologies.
	Monitoring	Laboratory analysis of soil samples to document soil conditions.	NA	NA	+	+	+	Applicable only to documenting site conditions and the effectiveness of other treatment technologies.
REMOVAL	Excavation and Off-site Disposal	Contaminated soil would be excavated from the site and disposed of at an appropriate off-site facility (with or without pretreatment).	++	++	--	0	-	Shallow soil excavation may be relatively high cost and would have increased implementation risk, but is very effective and relatively easy to implement.
CONTAINMENT	Capping	Installation of cover to prevent contact with contaminated soil.	+	0	0	0	+	Applicable and effective. Moderate level of long-term effectiveness (requires maintenance), ease of implementation, and cost. Minor risks during implementation associated with potential worker contact.
IN SITU BIOLOGICAL TREATMENT	Bioventing	Delivering oxygen to contaminated (unsaturated) soils by forced air movement to stimulate biodegradation.	--	--	0	--	--	Arsenic not readily amenable to <i>in situ</i> biodegradation treatment, both oxidation states are toxic.
	Enhanced Bioremediation (Bioaugmentation, Biostimulation)	Adding nutrients, electron donors/acceptors, selected microbial cultures, or other amendments to enhance bioremediation.	--	--	-	--	--	Arsenic not readily amenable to enhanced biodegradation, both oxidation states are toxic.
	Land Treatment	Combination of aeration (tilling) and amendments to enhance bioremediation in surface soils.	--	--	-	--	--	Arsenic not readily amenable to enhanced biodegradation, both oxidation states are toxic.
	Natural Attenuation	Using natural processes to reduce contaminant concentrations to acceptable levels.	--	--	++	++	++	Natural processes likely will not reduce contaminant concentrations to acceptable levels within reasonable timeframe (> 10 years).
	Phytoremediation	Using plants to remove, transfer, stabilize, or destroy contaminants in soil.	--	-	-	--	0	Land use requirements not compatible with site use.
IN SITU PHYSICAL/ CHEMICAL/ THERMAL TREATMENT	Chemical Oxidation	Chemically converts hazardous contaminants to less toxic compounds by oxidation.	0	+	--	--	--	Less effective for arsenic, both oxidation states are toxic. Relatively high cost and implementation risk. Delivery to shallow unsaturated soil would be difficult.
	Electrokinetic Separation	Use of electrochemical/electrokinetic processes to desorb and remove metals and polar organics.	0	0	-	--	-	Would require introduction of surfactant or organic modifier. Less effective in shallow soil (would need to include flushing and capture).
	Fracturing	Development of cracks in low permeability or overconsolidated soils to create passageways that increase the effectiveness of other <i>in situ</i> processes and extraction technologies.	NA	NA	+	--	+	Applicable only to improve effectiveness of other technologies. Not effective in shallow soil.
	Low-Flow Ventilation	Low-flow fan used to create low pressure directly beneath building slabs and prevent vapor migration into buildings.	--	--	0	--	--	Not effective for site conditions consisting of shallow uncovered soil contaminated by non-volatile compounds
	Soil Flushing	Water (or water containing an additive to enhance contaminant solubility) is circulated through the soil to desorb contaminants, recovered, and treated.	-	-	-	-	-	Less effective for arsenic. Would require chelant and circulation infrastructure.

Notes:  
Shading represents technologies that have been eliminated from consideration.  
1. Technology Rating: (++) Very Positive; (+) Positive; (0) Neutral; (-) Negative; (--) Very Negative  
2.

Table 2  
Initial Screening and Evaluation of Technologies for Shallow Soil  
Swan Island Upland Facility Operable Unit 2  
Portland, Oregon

General Response Action	Technology	Description	Evaluation Criteria					Screening Comments
			Protectiveness/ Short-Term Effectiveness	Permanence/ Long-Term Effectiveness	Costs	Implementability	Management of Short-Term Risks	
IN SITU PHYSICAL/ CHEMICAL/ THERMAL TREATMENT (continued)	Soil Vapor Extraction	Vacuum is applied through vapor extraction wells to create a pressure/concentration gradient that induces vapor-phase volatiles to be removed from soil.	--	--	-	--	--	Not effective for arsenic.
	Solidification/ Stabilization/ Vitrification	Contaminants are physically bound or enclosed within a stabilized mass (solidification and vitrification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (stabilization).	0	0	--	-	0	High implementation cost. Leaching not an issue of concern. Not substantively more effective than capping at higher cost.
	Thermally Enhanced Soil Vapor Extraction Treatment	High energy injection (steam/hot air, electrical resistance, electromagnetic, fiber optic, radio frequency) is used to increase the volatilization rate of semi-volatiles and facilitate extraction.	--	--	--	--	-	Less effective for shallow soil area. Not effective for non-volatile contaminants. High implementation cost.
EX SITU BIOLOGICAL TREATMENT	Biopiles	Excavated soils are mixed with soil amendments and placed in aboveground enclosures and aerated with blowers or vacuum pumps.	--	--	0	-	--	Arsenic not readily amenable to enhanced biodegradation, both oxidation states are toxic.
	Composting	Excavated soil is mixed with bulking agents and organic amendments to promote microbial activity.	--	--	0	-	--	Arsenic not readily amenable to enhanced biodegradation, both oxidation states are toxic.
	Landfarming	Excavated soil is placed in lined beds and periodically tilled to aerate the soil.	--	--	0	--	--	Arsenic not readily amenable to enhanced biodegradation, both oxidation states are toxic.
	Slurry Phase Biological Treatment	An aqueous slurry of soil, sediment, or sludge with water and other additives is mixed to keep solids suspended and microorganisms in contact with the soil contaminants. When complete, the slurry is dewatered and the soil is disposed of.	--	--	--	--	--	Arsenic not readily amenable to enhanced biodegradation, both oxidation states are toxic.
EX SITU PHYSICAL/ CHEMICAL/ THERMAL TREATMENT	Chemical Extraction	Excavated soil is mixed with an extractant which dissolves the contaminants. The resultant solution is placed in a separator to remove the contaminant/extractant mixture for treatment.	+	+	--	-	-	Additional treatment would be required for recovered extractant. Would be combined with excavation.
	Incineration	High temperatures are used to combust (in the presence of oxygen) organic constituents in hazardous wastes.	--	--	--	0	--	Not compatible with inorganic arsenic constituents.Requires off-site transport to distant facility. Is expensive relative to other acceptable treatment/disposal technologies. Would be combined with excavation.
	Soil Washing	Contaminants are separated from the excavated soil with wash-water augmented with additives to help remove organics.	--	--	--	-	--	Not compatible with inorganic arsenic constituents. Additional treatment would be required for wash water. Would be combined with excavation.
	Solar Detoxification	Contaminants are destroyed by photochemical and thermal reactions using ultraviolet energy in sunlight.	--	--	--	--	--	Not compatible with inorganic arsenic constituents.
	Thermal Desorption/ Pyrolysis/ Hot Gas Decontamination	Waste soils are heated to either volatilize (desorption and hot gas) or to anaerobically decompose (pyrolysis) organic contaminants. Off-gas is collected and treated.	--	--	--	-	--	Not compatible with non-volatile arsenic constituents. Arsenic not compatible with biodegradation, both oxidation states are toxic. Requires off-site transport to distant facility. Is expensive relative to other acceptable treatment/disposal technologies. Would be combined with excavation.
	Separation	Separation techniques concentrate contaminated solids through physical, magnetic, and/or chemical means. The applicable technology for this case would be sieving excavated soil to return gravel particles to the site.	+	+	0	+	0	Surface soil contains significant gravel fraction that could be separated with sieving and returned to the site.

Notes:

Shading represents technologies that have been eliminated from consideration.

1. Technology Rating: (++) Very Positive; (+) Positive; (0) Neutral; (-) Negative; (--) Very Negative

2.

Table 3  
Cost Table – Excavation and Disposal  
Feasibility Study  
Swan Island Upland Facility Operable Unit 2

Alternative Component	Units	Unit Cost	Extension	Notes
<b>Capital</b>				
<b>Design, Permitting, and Procurement</b>				
Work Plan Preparation	1 LS	\$12,000 /each	\$12,000	For DEQ review and approval
Pilot Study	1 LS	\$5,000 /each	\$5,000	Assess sieving alternative
				Assume public bid; 2 design sheets at \$5,000 per sheet plus \$15,000 for
Drawings and Specifications	1 LS	\$25,000 /each	\$25,000	Port Engineering
Permitting	1 LS	\$5,000 /each	\$5,000	Assume Port leads permit process
Procurement/Contracting	1 LS	\$3,000 /each	\$3,000	Assume Port leads bid process
<b>Design and Procurement Subtotal</b>			<b>\$50,000</b>	
<b>Construction (Base - No Sieving; Backfill w/ Import Fill)</b>				
Utility Locating	4 hr	\$70 /hr	\$300	Unit rate from recent subcontract
Mobilization	1 LS	\$2,500 /each	\$2,500	Assume one excavator; one water truck
Dust Control	14 day	\$600 /day	\$8,400	Water truck/driver; purchase water from City (0.5 gal/sy/hr)
Soil Excavation and Load	1800 cy	\$15 /cy	\$27,000	Unit rate estimated from Means Cost Guide
Impacted Soil Waste Profiling				
Chemical Analyses (TCLP arsenic)	18 each	\$80 /each	\$1,440	1 sample per 100 cubic yards; Unit rate from lab price list
Waste Profiling Data Package	8 hr	\$125 /hr	\$1,000	Soil data compilation and prepare waste profile forms
Transport	3100 ton	\$10 /ton	\$31,000	Assume 3 hr round trip; 30 ton/load; \$100/hr
Disposal	3100 ton	\$30 /ton	\$93,000	Quote from Waste Management for Hillsboro Landfill
				Assume one sample per 100 linear feet perimeter; one sample per 5000 sf
Confirmation Soil Sampling and Chemical Analyses	22 each	\$20 /each	\$440	bottom; analyze for total arsenic; Unit rate from lab price list
Imported Clean Structural Fill (material and transport)	3100 ton	\$20 /ton	\$62,000	Oregon Department of Transportation (ODOT) Class B and D backfill
Place and Compact	1800 cy	\$10 /cy	\$18,000	Unit rate estimated from Means Cost Guide
Engineering Oversight	14 day	\$1,500 /day	\$21,000	
<b>Construction Subtotal</b>			<b>\$266,000</b>	
<b>Sieving Alternate (Net Change from Base Construction)</b>				
<b>Soil Sieving</b>				
Mobilize Sieve	1 LS	\$2,000 /each	\$2,000	
Sieving	1800 cy	\$12 /cy	\$21,600	Assumed 30 cy/hour throughput; Unit rate from rental cost estimate
Dust Control	7 day	\$600 /day	\$4,200	Water truck/driver; purchase water from City
Transport	(1000) ton	\$10 /ton	(\$10,000)	Assume 3 hr round trip; 30 ton/load; \$100/hr
Disposal	(1000) ton	\$30 /ton	(\$30,000)	Quote from Waste Management for Hillsboro Landfill
				1000 tons less of imported gravel required - 1000 tons of gravel generated
Imported Clean Structural Fill (material and transport)	(1000) ton	\$20 /ton	(\$20,000)	from sieving
Engineering Oversight	7 day	\$1,500 /day	\$10,500	\$150/hour at 10 hours per day
Contingency - Sieving	100 %	\$21,600	\$21,600	Very uncertain; may require sieving twice
Contingency - Other	15 %	(\$45,300)	(\$6,795)	Match contingency in Base construction
<b>Sieve Alternate Subtotal</b>			<b>(\$7,000)</b>	
<b>On-Site Re-Grade Alternate (Net Change from Base Construction)</b>				
Mobilization	1 LS	\$2,000 /each	\$2,000	Assume one grader
Survey	1 LS	\$4,800 /each	\$4,800	Topographic survey for grade checking (4 Acres)
Regrade Site	4 ac	\$4,600 /ac	\$18,400	Unit rate estimated from Means
Dust Control	(3) day	\$600 /day	(\$1,800)	Water truck/driver; purchase water from City
				Assume 4 inches of gravel added to excavation areas (net 1000 tons);
Imported Clean Structural Fill (material and transport)	(2100) ton	\$20 /ton	(\$42,000)	Oregon Department of Transportation (ODOT) Class B and D backfill
Place and Compact	(1200) cy	\$10 /cy	(\$12,000)	Unit rate estimated from Means Cost Guide
Engineering Oversight	(3) day	\$1,500 /day	(\$4,500)	\$150/hour at 10 hours per day
Contingency - Other	15 %	(\$35,100)	(\$5,265)	Match contingency in Base construction
<b>Re-Grade Alternate Subtotal</b>			<b>(\$40,000)</b>	
<b>Long-Term (Net Present Worth)</b>				
None			\$0	
<b>Long-Term Subtotal (Net Present Worth)</b>			<b>\$0</b>	
<b>Contingency</b>				
Contingency	15 %	\$316,000	\$47,400	
<b>Contingency Subtotal</b>			<b>\$47,000</b>	
<b>Total</b>				
<b>Low End Total</b>			<b>\$316,000</b>	
<b>High End Total</b>			<b>\$363,000</b>	



Table 4  
Cost Table – Excavate Hot Spot and Cap  
Feasibility Study  
Swan Island Upland Facility Operable Unit 2

Alternative Component	Units	Unit Cost	Extension	Notes
<b>Capital</b>				
<b>Design, Permitting, and Procurement</b>				
Work Plan Preparation	1 LS	\$12,000 /each	\$12,000	For DEQ review and approval
Survey	1 LS	\$8,400 /each	\$8,400	Pre-design topograph survey (7 acres)
				Assume public bid; 4 design sheets at \$5,000 per sheet plus \$15,000 for
Drawings and Specifications	1 LS	\$35,000 /each	\$35,000	Port Engineering
Permitting	1 LS	\$10,000 /each	\$10,000	Assume Port leads permit process; paving increases costs
Procurement/Contracting	1 LS	\$8,000 /each	\$8,000	Assume Port leads bid process; paving increases costs
Soil Management Plan/Institutional Controls	1 LS	\$10,000 /each	\$10,000	
<b>Design and Procurement Subtotal</b>			<b>\$83,400</b>	
<b>Construction (Base - No Sieving; Backfill w/ Import Fill)</b>				
Utility Locating	2 hr	\$70 /hr	\$100	Unit rate from recent subcontract
Mobilization	1 LS	\$6,500 /each	\$6,500	Assume one excavator; one water truck; one grader; one pave
Dust Control	7 day	\$600 /day	\$4,200	Water truck/driver; purchase water from City (0.5 gal/sy/hr)
Hot Spot Soil Excavation and Load	800 cy	\$15 /cy	\$12,000	Unit rate estimated from Means Cost Guide
Impacted Soil Waste Profiling				
Chemical Analyses (TCLP arsenic)	8 each	\$80 /each	\$640	1 sample per 100 cubic yards; Unit rate from lab price list
Waste Profiling Data Package	8 hr	\$125 /hr	\$1,000	Soil data compilation and prepare waste profile forms
Transport	1350 ton	\$10 /ton	\$13,500	Assume 3 hr round trip; 30 ton/load; \$100/hr
Disposal	1350 ton	\$30 /ton	\$40,500	Quote from Waste Management for Hillsboro Landfill
				Assume one sample per 100 linear feet perimeter; one sample per 5000 sf
Confirmation Soil Sampling and Chemical Analyses	8 each	\$20 /each	\$160	bottom; analyze for total arsenic
				Assume approximately one-third of DTNA lease area graded to achieve
Site Grading	2 ac	\$5,000 /ac	\$10,000	drainage; Unit rate estimated from Means Cost Guide
Purchase/Deliver Base Rock	1700 ton	\$20 /ton	\$34,000	Oregon Department of Transportation (ODOT) Class B and D backfil
Place and Compact	1000 cy	\$10 /cy	\$10,000	Unit rate estimated from Means Cost Guide
Asphalt Concrete Pavement (in-place)	5900 sy	\$23 /sy	\$135,700	Unit rate estimated from Means Cost Guide and recent subcontrac
Engineering Oversight	11 day	\$1,500 /day	\$16,500	
<b>Construction Subtotal</b>			<b>\$285,000</b>	
<b>Long-Term (Net Present Worth)</b>				
				Assume net discount rate of 2.5% for present-worth calculations
Annual Inspections	40 yr	\$1,000 /yr	\$25,103	
Fill Cracks	1 per 5 yr	\$10,000 /5 yr	\$47,757	
Seal-Coat	1 per 10 yr	\$12,000 /10 yr	\$26,888	
Overlayment	1 per 20 yr	\$45,200 /20 yr	\$44,418	1/3rd of initial paving cost
5-year review	1 per 5 yr	\$5,000 /5 yr	\$23,879	
<b>Long-Term Subtotal (Net Present Worth)</b>			<b>\$168,000</b>	
<b>Contingency</b>				
Contingency	15 %	\$536,400	\$80,460	
<b>Contingency Subtotal</b>			<b>\$80,000</b>	
<b>Total</b>			<b>Total</b>	<b>\$616,400</b>

Table 5  
Cost Table – Cap  
Feasibility Study  
Swan Island Upland Facility Operable Unit 2

Alternative Component	Units	Unit Cost	Extension	Notes
<b>Capital</b>				
<b>Design, Permitting, and Procurement</b>				
Work Plan Preparation	1 LS	\$12,000 /each	\$12,000	For DEQ review and approval
Survey	1 LS	\$8,400 /each	\$8,400	Pre-design topograph survey (7 acres)
				Assume public bid: 4 design sheets at \$5,000 per sheet plus \$15,000 for
Drawings and Specifications	1 LS	\$35,000 /each	\$35,000	Port Engineering
Permitting	1 LS	\$10,000 /each	\$10,000	Assume Port leads permit process; paving increases costs
Procurement/Contracting	1 LS	\$8,000 /each	\$8,000	Assume Port leads bid process; paving increases costs
Soil Management Plan/Institutional Controls	1 LS	\$10,000 /each	\$10,000	
<b>Design and Procurement Subtotal</b>			<b>\$83,400</b>	
<b>Construction (Base - No Sieving; Backfill w/ Import Fill)</b>				
Utility Locating	2 hr	\$100 /hr	\$200	Unit rate from recent subcontract
Mobilization	1 LS	\$4,000 /each	\$4,000	Assume one water truck; one grader; one paver
Dust Control	7 day	\$600 /day	\$4,200	Water truck/driver; purchase water from City (0.5 gal/sy/hr)
				Assume approximately half OU2 graded to achieve drainage; Unit rate
Site Grading	1.5 ac	\$5,000 /ac	\$7,500	estimated from Means Cost Guide
Purchase/Deliver Base Rock	2000 ton	\$20 /ton	\$40,000	Oregon Department of Transportation (ODOT) Class B and D backfil
Place and Compact	1200 cy	\$10 /cy	\$12,000	Unit rate estimated from Means Cost Guide
Asphalt Concrete Pavement (in-place)	7200 sy	\$22 /sy	\$158,400	Unit rate estimated from Means Cost Guide and recent subcontract
Engineering Oversight	7 day	\$1,500 /day	\$10,500	
<b>Construction Subtotal</b>			<b>\$237,000</b>	
<b>Long-Term (Net Present Worth)</b>				
				Assume net discount rate of 2.5% for present-worth calculations
Annual Inspections	40 yr	\$1,000 /yr	\$25,103	
Fill Cracks	1 per 5 yr	\$10,000 /5 yr	\$47,757	
Seal-Coat	1 per 10 yr	\$12,000 /10 yr	\$26,888	
Overlayment	1 per 20 yr	\$52,800 /20 yr	\$51,887	1/3rd of initial paving cost
5-year review	1 per 5 yr	\$5,000 /5 yr	\$23,879	
<b>Long-Term Subtotal (Net Present Worth)</b>			<b>\$176,000</b>	
<b>Contingency</b>				
Contingency	15 %	\$496,400	\$74,460	
<b>Contingency Subtotal</b>			<b>\$74,000</b>	
<b>Total</b>			<b>Total</b>	<b>\$570,400</b>

Table 6  
Comparison of Remedial Action Alternatives  
Swan Island Upland Facility Operable Unit 2  
Portland, Oregon

Release Area Alternative	Protective	Balancing Factors																Score	Rank				
		Effectiveness				Long-Term Reliability				Implementability				Implementation Risk						Reasonableness of Cost			
		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D		
A) No Action	No		-	-	-		-	-	-		+	+	+		+	+	+		+	+	+	3	na
B) Excavation and Disposal	Yes	+		+	+	+		+	+	-		0	0	-		-	-	-		+	+	3	1
C) Hot Spot Removal/Cap	Yes	+	-		+	+	-		+	-	0		0	-	+		-	-		-	-	-3	3
D) Cap	Yes	+	-	-		+	-	-		-	0	0		-	+	+		-	-	+		-3	2

**Notes:**

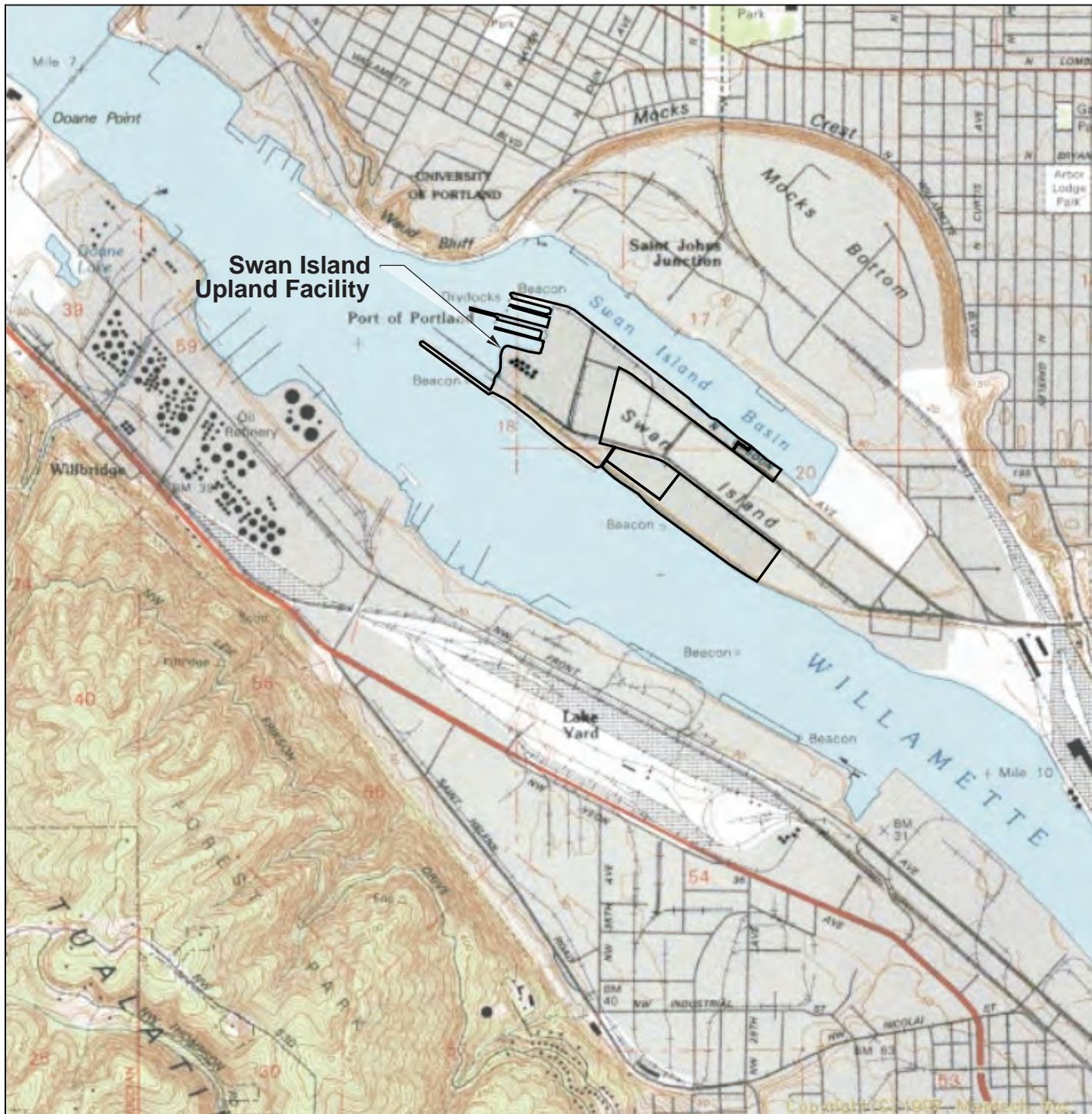
+ = The alternative is favored over the compared alternative (score=1)

0 = The alternative is equal with the compared alternative (score=0)

- = The alternative is less favorable than the compared alternative (score=-1)

na = Not protective, therefore not ranked

vs Technology				
Technology A		B	C	D
Technology B	A		C	D
Technology C	A	B		D
Technology D	A	B	C	



NOTE: Base map prepared from USGS 7.5-minute quadrangles as provided by Topozone. (1990)

0 2,000 4,000  
Approximate Scale in Feet



## Facility Location Map

Feasibility Study  
Swan Island Upland Facility Operable Unit 2  
Portland, Oregon



Ash Creek Associates  
A Division of Apex Companies, LLC



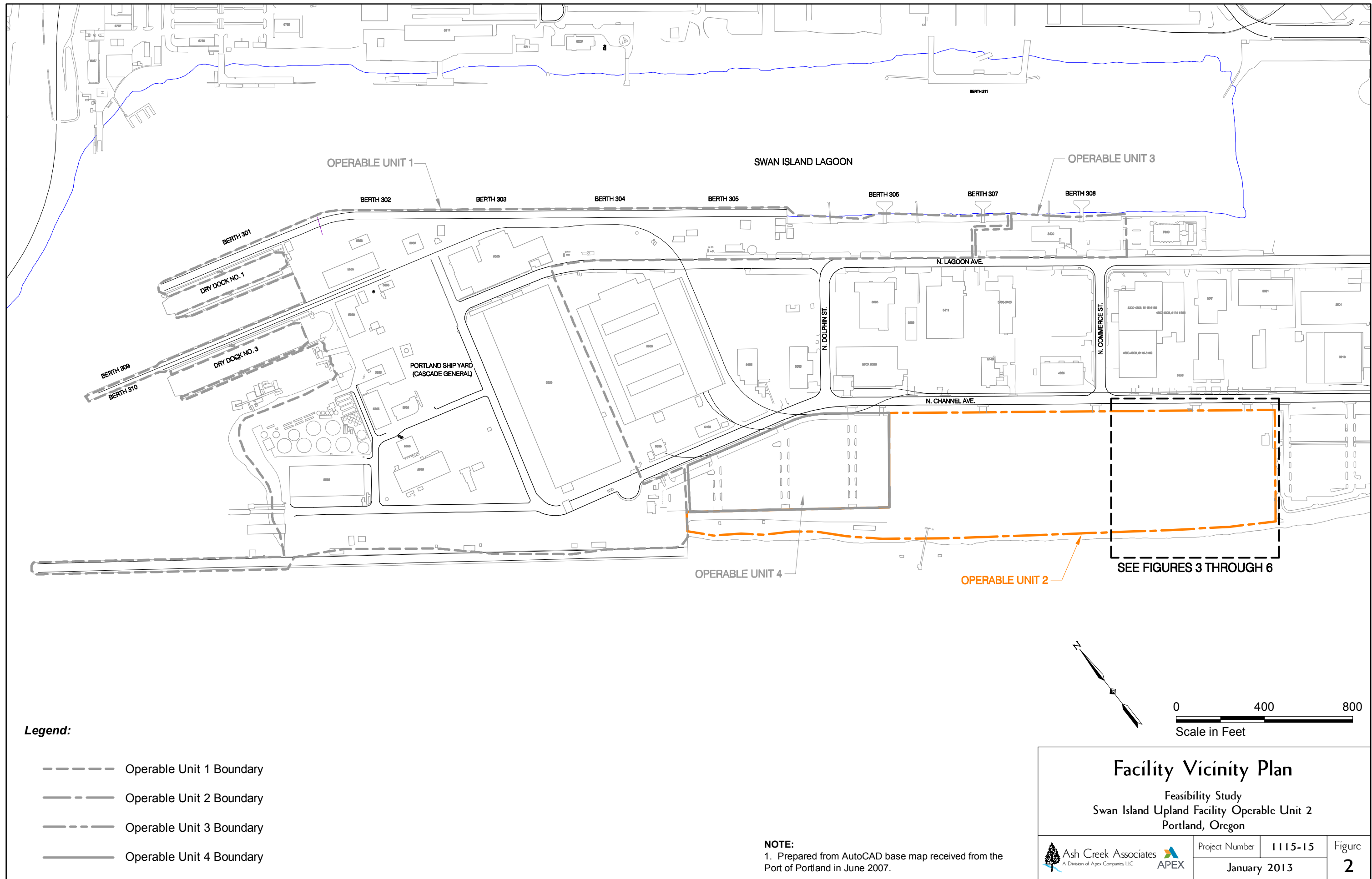
Project Number

1115-15

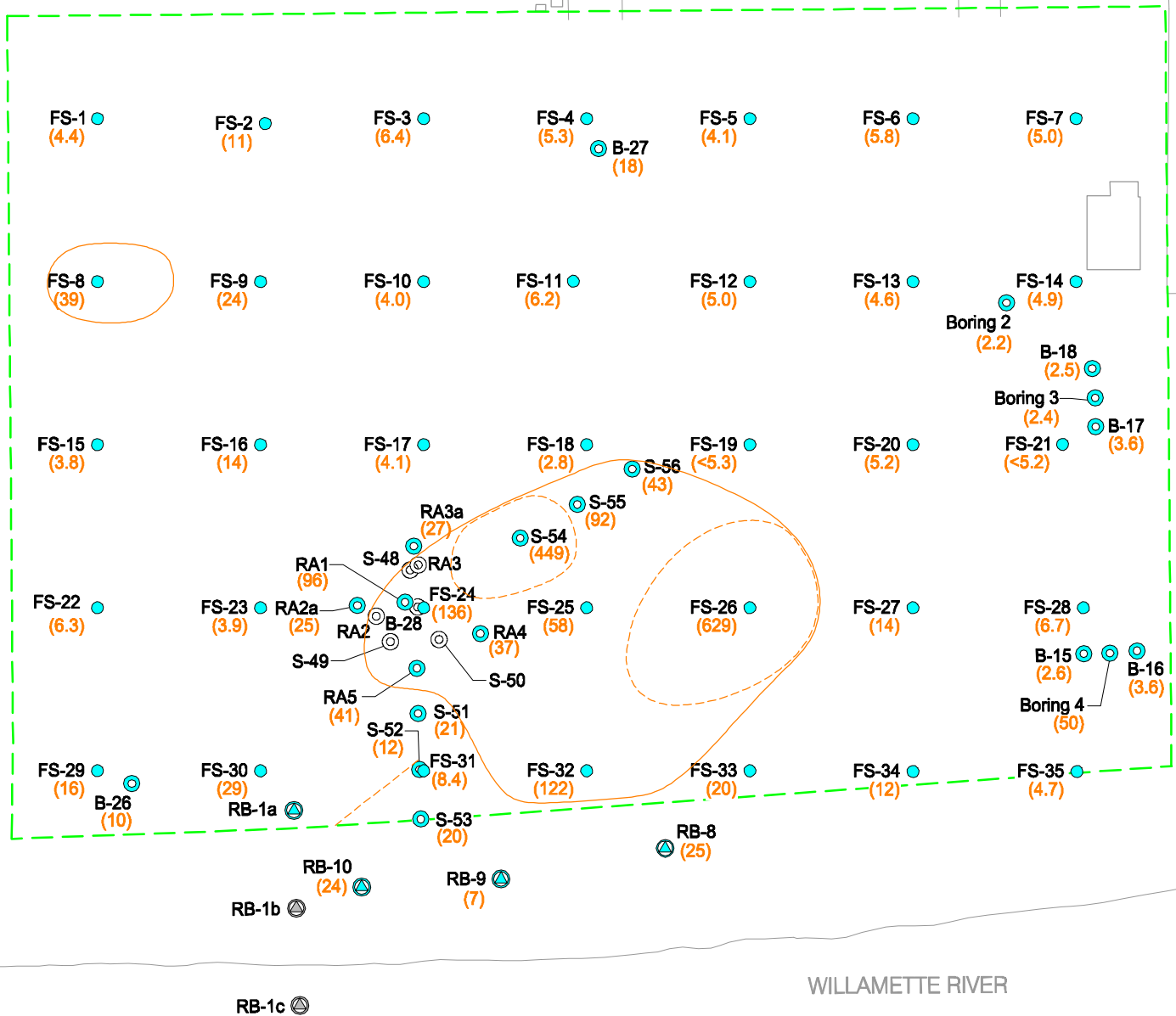
Figure

January 2013

1







#### Legend:

(10) Arsenic Concentration in mg/kg

— Remediation Level (33 mg/kg)

- - - Hot Spot Level (170 mg/kg)

FS-1 ● 2012 Exploration Location

B-26 ● Soil Sampling Location

RB-1a ▲ Riverbank Soil Sampling Location

B-28 ○ Soil Sampling Location  
(Soil Removed During 2006 Removal)

--- Daimler Trucks North America Lease Area  
(Approximate)

#### NOTES:

1. Where multiple samples collected at a location, concentration shown is maximum in the depth interval of 0-3 feet.
2. Arsenic concentrations greater than the Remediation Level detected only in the 0-1 foot interval.

## Arsenic in Surface Soil

Feasibility Study  
Swan Island Upland Facility Operable Unit 2  
Portland, Oregon



Ash Creek Associates  
A Division of Apex Companies, LLC



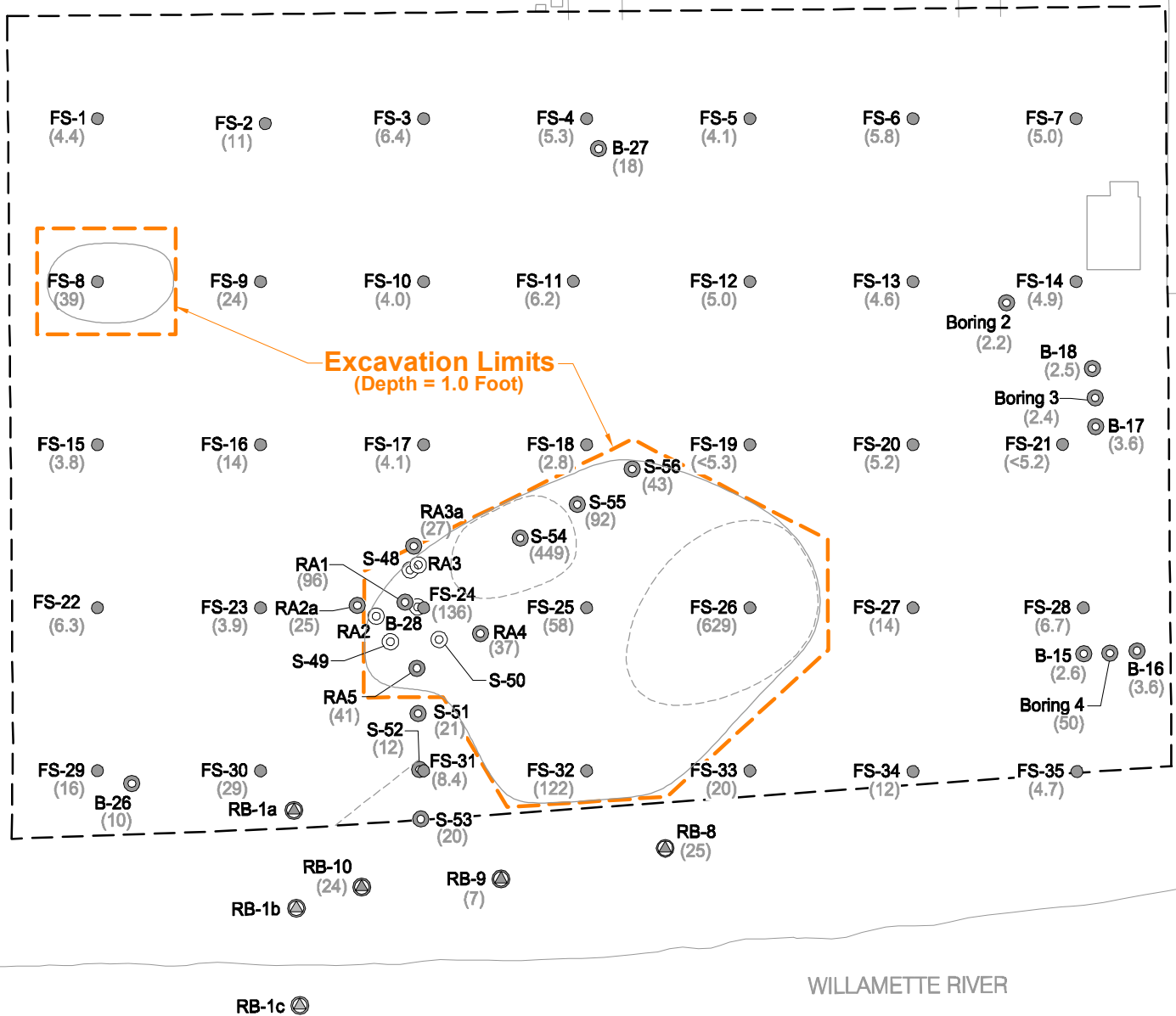
Project Number

1115-15

January 2013

Figure

3



#### Legend:

(10) Arsenic Concentration in mg/kg

— Remediation Level (32 mg/kg)

--- Hot Spot Level (170 mg/kg)

FS-1 ● 2012 Exploration Location

B-26 ● Soil Sampling Location

RB-1a ● Riverbank Soil Sampling Location

B-28 ● Soil Sampling Location  
(Soil Removed During 2006 Removal)

□ Daimler Trucks North America Lease Area  
(Approximate)

#### NOTES:

- Where multiple samples collected at a location, concentration shown is maximum in the depth interval of 0-3 feet.
- Arsenic concentrations greater than the Remediation Level detected only in the 0-1 foot interval.

## Excavation and Disposal Alternative

Feasibility Study  
Swan Island Upland Facility Operable Unit 2  
Portland, Oregon



Ash Creek Associates  
A Division of Apex Companies, LLC



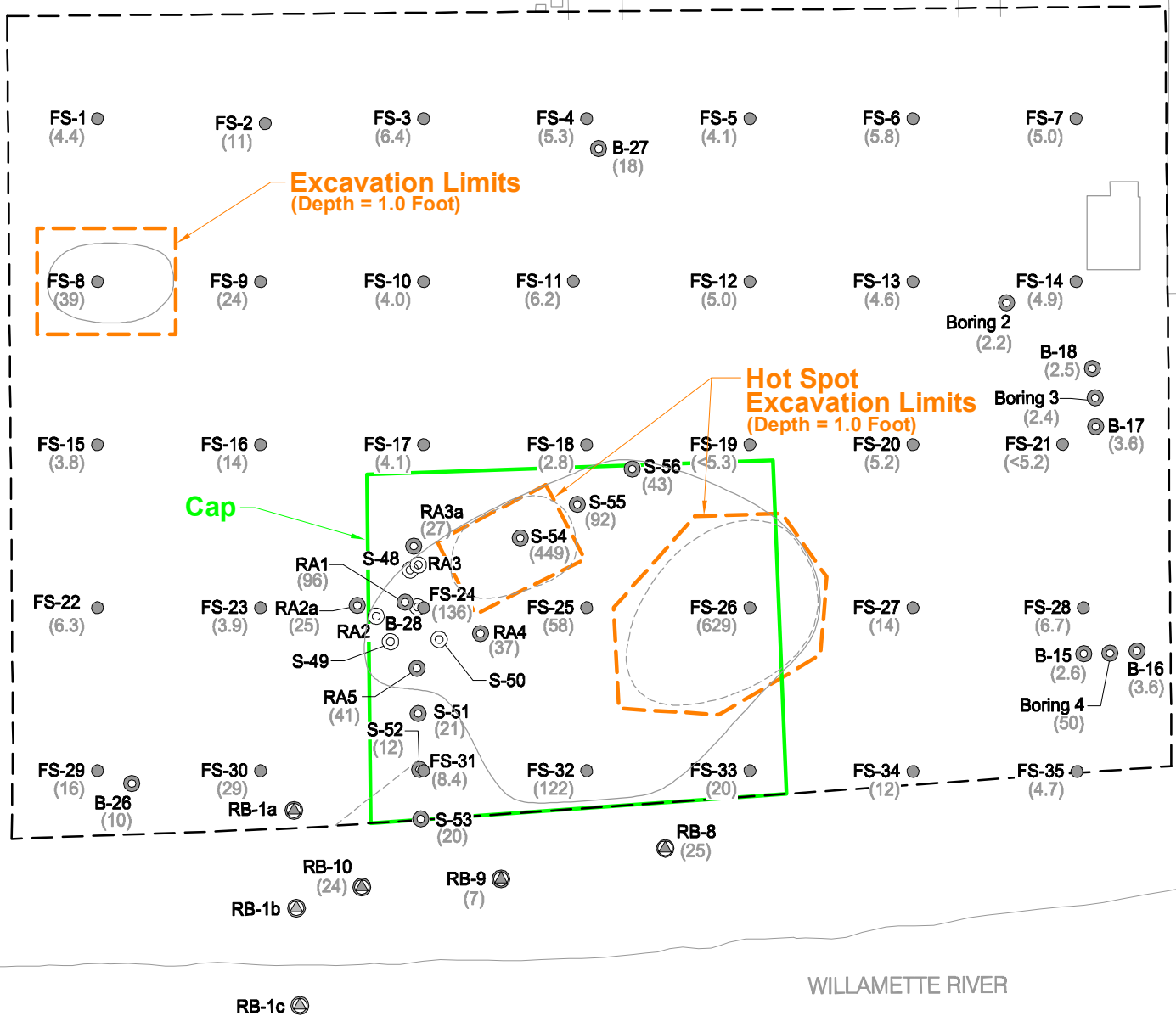
Project Number

1115-15

January 2013

Figure

4



## Hot Spot Removal and Cap Alternative

Feasibility Study  
Swan Island Upland Facility Operable Unit 2  
Portland, Oregon



Ash Creek Associates  
A Division of Apex Companies, LLC



Project Number

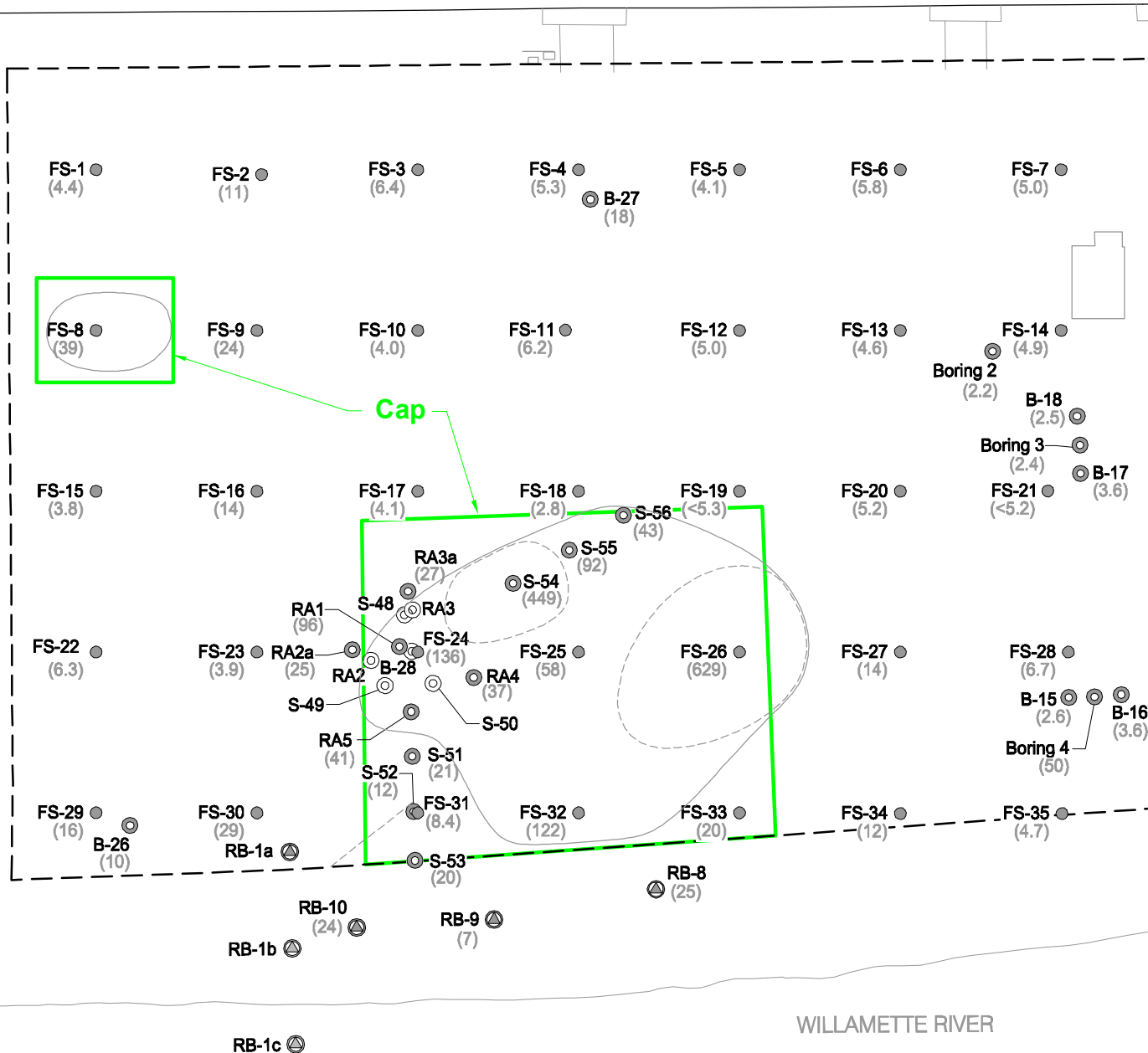
1115-15

January 2013

Figure

5





#### Legend:

(10) Arsenic Concentration in mg/kg

— Remediation Level (32 mg/kg)

- - - Hot Spot Level (170 mg/kg)

FS-1 ● 2012 Exploration Location

B-26 ● Soil Sampling Location

RB-1a ● Riverbank Soil Sampling Location

B-28 ● Soil Sampling Location  
(Soil Removed During 2006 Removal)

□ Daimler Trucks North America Lease Area  
(Approximate)

#### NOTES:

- Where multiple samples collected at a location, concentration shown is maximum in the depth interval of 0-3 feet.
- Arsenic concentrations greater than the Remediation Level detected only in the 0-1 foot interval.

## Cap Alternative

Feasibility Study  
Swan Island Upland Facility Operable Unit 2  
Portland, Oregon



Ash Creek Associates  
A Division of Apex Companies, LLC



Project Number

1115-15

January 2013

Figure

6

## ***Appendix A***

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### **Data Tables and Sampling Plans**

Table 1  
Surface Soil Analytical Results - Operable Unit 2, Daimler Leasehold  
Swan Island Upland Facility  
Portland, Oregon

Sample Name	Sample Date	Arsenic Concentration in mg/kg (ppm)
FS-1-1	7/22/2012	4.42 J
FS-1-2	7/22/2012	2.97 J
FS-1-3	7/22/2012	4.11 J
FS-2-1	7/22/2012	4.29 J
FS-2-2	7/22/2012	11.1
FS-2-3	7/22/2012	2.56 J
FS-3-1	7/21/2012	6.42 J
FS-3-2	7/21/2012	4.49 J
FS-3-3	7/21/2012	5.01 J
FS-4-1	7/21/2012	4.59 J
FS-4-2	7/21/2012	4.15 J
FS-4-3	7/21/2012	5.28 J
FS-5-1	7/21/2012	4.10 J
FS-5-2	7/21/2012	2.62 J
FS-5-3	7/21/2012	3.77 J
FS-6-1	7/21/2012	5.77 J
FS-6-2	7/21/2012	5.66 J
FS-6-3	7/21/2012	3.91 J
FS-7-1	7/21/2012	3.24 J
FS-7-2	7/21/2012	4.96 J
FS-7-3	7/21/2012	3.69 J
FS-8-1	7/22/2012	39.3
FS-8-2	7/22/2012	4.35 J
FS-8-3	7/22/2012	4.80 J
FS-9-1	7/22/2012	23.8
FS-9-2	7/22/2012	3.38 J
FS-9-3	7/22/2012	3.16 J
FS-10-1	7/21/2012	3.21 J
FS-10-2	7/21/2012	3.97 J
FS-10-3	7/21/2012	4.00 J
FS-11-1	7/21/2012	6.17 J
FS-11-2	7/21/2012	3.63 J
FS-11-3	7/21/2012	3.89 J
FS-12-1	7/21/2012	2.21 J
FS-12-2	7/21/2012	3.71 J
FS-12-3	7/21/2012	5.04 J
FS-13-1	7/21/2012	3.22 J
FS-13-2	7/21/2012	4.59 J
FS-13-3	7/21/2012	4.02 J
FS-14-1	7/21/2012	3.67 J
FS-14-2	7/21/2012	4.87 J
FS-14-3	7/21/2012	4.16 J
FS-15-1	7/22/2012	3.83 J
FS-15-2	7/22/2012	3.67 J
FS-15-3	7/22/2012	3.66 J
FS-16-1	7/22/2012	13.9
FS-16-2	7/22/2012	2.61 J
FS-16-3	7/22/2012	4.42 J
FS-17-1	7/21/2012	4.13 J
FS-17-2	7/21/2012	3.47 J
FS-17-3	7/21/2012	3.72 J

Please refer to notes at end of table.

Table 1  
Surface Soil Analytical Results - Operable Unit 2, Daimler Leasehold  
Swan Island Upland Facility  
Portland, Oregon

Sample Name	Sample Date	Arsenic Concentration in mg/kg (ppm)
FS-18-1	7/21/2012	2.30 J
FS-18-2	7/21/2012	2.80 J
FS-18-3	7/21/2012	<6.26
FS-19-1	7/21/2012	<4.49
FS-19-2	7/21/2012	<4.46
FS-19-3	7/21/2012	<5.27
FS-20-1	7/21/2012	5.25
FS-20-2	7/21/2012	<4.58
FS-20-3	7/21/2012	<5.01
FS-21-1	7/21/2012	<4.21
FS-21-2	7/21/2012	<5.03
FS-21-3	7/21/2012	<5.16
FS-22-1	7/22/2012	6.27
FS-22-2	7/22/2012	<4.04
FS-22-3	7/22/2012	<4.21
FS-23-1	7/22/2012	3.87 J
FS-23-2	7/22/2012	<5.59
FS-23-3	7/22/2012	<5.48
FS-24-1	7/21/2012	136
FS-24-2	7/21/2012	2.15 J
FS-24-3	7/21/2012	5.19 J
FS-25-1	7/21/2012	58.2
FS-25-2	7/21/2012	3.55 J
FS-25-3	7/21/2012	5.77 J
FS-26-1	7/21/2012	629
FS-26-2	7/21/2012	<4.92
FS-26-3	7/21/2012	<5.62
FS-27-1	7/21/2012	14
FS-27-2	7/21/2012	4.93
FS-27-3	7/21/2012	<3.99
FS-28-1	7/21/2012	6.72
FS-28-2	7/21/2012	4.87
FS-28-3	7/21/2012	<5.20
FS-29-1	7/22/2012	15.8
FS-29-2	7/22/2012	5.27 J
FS-29-3	7/22/2012	<4.51
FS-30-1	7/22/2012	29.3
FS-30-2	7/22/2012	<4.11
FS-30-3	7/22/2012	<4.12
FS-31-1	7/22/2012	8.43
FS-31-2	7/22/2012	3.70 J
FS-31-3	7/22/2012	7.73
FS-32-1	7/21/2012	122
FS-32-2	7/21/2012	4.68 J
FS-32-3	7/21/2012	<4.20
FS-33-1	7/21/2012	19.6
FS-33-2	7/21/2012	3.00 J
FS-33-3	7/21/2012	<4.18
FS-34-1	7/21/2012	11.6
FS-34-2	7/21/2012	6.21
FS-34-3	7/21/2012	<4.53
FS-35-1	7/21/2012	<4.31
FS-35-2	7/21/2012	4.72
FS-35-3	7/21/2012	<4.21

**Notes:**

1. mg/kg (ppm) = Milligrams per kilogram (parts per million).
2. J = Estimated concentration.
3. Arsenic is analyzed by EPA Method 6010C.
4. Shaded values exceed DEQ default background concentration of 7 mg/kg.

Table 2 - Soil Analytical Results: Total Metals

SIUF - OU2

Portland, Oregon

Outfall Pipe ID: Sample ID: Sample Date:	2006 Sampling			2008 Sampling								JSCS SLV
	WR-164 RB-1 Composite 9/26/2006	WR-159 RB-2 Composite 9/26/2006	WR-160 RB-3 Composite 9/26/2006	WR-399 RB-4 Composite 10/1/2008	WR-399 RB-4a 10/1/2008	WR-399 RB-4b 10/1/2008	WR-399 RB-4c 10/1/2008	CG-26 RB-5 Composite 10/1/2008	CG-26 RB-5a 10/1/2008	CG-26 RB-5b 10/1/2008	CG-26 RB-5c 10/1/2008	
Metals (mg/kg)												
Antimony	0.93	0.4	0.35	0.35	--	--	--	0.37	--	--	--	64
Arsenic	12.2	3.8	7	3.4	--	--	--	2.7	--	--	--	7
Cadmium	1.04	0.46	0.48	0.238	--	--	--	0.763	--	--	--	1
Chromium	29	19.9	22	13.6	--	--	--	13.8	--	--	--	111
Copper	271	92.4	96.3	65.9	--	--	--	33.3	--	--	--	149
Lead	85.6	43.2	36	41.3	27.2	170	91.4	20.1	30.1	15.2	6.94	17
Nickel	26.8	16.9	20.3	15.0	--	--	--	17.9	--	--	--	48.6
Silver	0.19	0.09	0.14	0.05	--	--	--	0.04	--	--	--	5
Zinc	835	174	264	153	--	--	--	246	--	--	--	459

Outfall Pipe ID: Sample ID: Sample Date:	2008 Sampling								JSCS SLV
	CG-27 RB-6 Composite 10/1/2008	CG-27 RB-6a 10/1/2008	CG-27 RB-6b 10/1/2008	CG-27 RB-6c 10/1/2008	WR-159a RB-7 Composite 10/1/2008	WR-159a RB-7a 10/1/2008	WR-159a RB-7b 10/1/2008	WR-159a RB-7c 10/1/2008	
Metals (mg/kg)									
Antimony	0.27	--	--	--	0.63	--	--	--	64
Arsenic	3.1	--	--	--	2.9	--	--	--	7
Cadmium	1.11	--	--	--	0.189	--	--	--	1
Chromium	14.9	--	--	--	22.9	--	--	--	111
Copper	57.7	--	--	--	71.3	--	--	--	149
Lead	42.6	58.2	87.5	33.6	57.5	84.2	104	18.5	17
Nickel	16.6	--	--	--	24.6	--	--	--	48.6
Silver	0.06	--	--	--	0.07	--	--	--	5
Zinc	359	--	--	--	121	--	--	--	459

**Notes:**

1. Metals analysis by EPA 6000/7000 Series Methods.
2. mg/kg = Milligrams per kilogram (parts per million).
3. JSCS SLV = Portland Harbor Joint Source Control Strategy Table 3-1: Screening Level Values for Soil/Storm Water Sediment (7/16/07 Revision).
4. Shading indicates that the reported concentration exceeds the screening level.

**Table 3**  
**Metal Concentrations in Soil (mg/kg)**  
**Swan Island Upland Facility - Operable Unit 2**

Area of Investigation	Sample No.	Sample Location	Sample Depth (ft)	Antimony	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc	Barium	Selenium
North Channel Avenue Fabrication Site	4800-010124-037	B-13	2.0	14.1 U	3.0	1.4 U	23.8	23.6	5.2	0.06	27.1	2.8 U	66.3		
	4800-010124-038	B-13	5.0	11.3 U	2.6	1.1 U	18.6	18.6	3.9	0.02	21.1	2.3 U	58.2		
	4800-010124-035	B-14	2.0	11.9 U	3.7	1.2 U	31.4	805	158	0.18	20.7	2.4 U	652		
	4800-010124-036	B-14	5.0	10.8 U	2.1	1.1 U	12.3	14	2.7	0.02 U	16.9	2.2 U	44.0		
	4800-010205-077	B-15	2.0	12.1 U	2.6	1.2 U	21.8	19.9	5.4	0.11	23.3	2.4 U	48.6		
	4800-010205-078	B-15	5.0	11.2 U	2.3	1.1 U	14.4	15.5	5.4	0.02 U	19.3	2.2 U	50.9		
	4800-010205-075	B-16	2.0	10.7 U	3.6	1.1 U	29.1	36.1	10.2	0.05	26.9	2.1 U	70.4		
	4800-010205-076	B-16	5.0	11.2 U	2.2	1.1 U	14.3	15.8	4.1	0.02 U	19.4	2.2 U	48.4		
	4800-010205-081	B-17	2.0	10.4 U	3.6	1.0 U	28.8	33.8	6.6	0.04	24.7	2.1 U	63.3		
	4800-010205-082	B-17	5.0	11.3 U	2.0	1.1 U	17.0	17.0	5.9	0.02 U	22.8	2.3 U	50.3		
	4800-010205-079	B-18	2.0	11.8 U	2.5	1.2 U	27.1	27.5	5.8	0.03	35.0	2.4 U	56.5		
	4800-010205-080	B-18	5.0	10.3 U	2.1	1.0 U	14.8	18.3	4.0	0.02	18.3	2.1 U	44.4		
	4800-010124-032	B-19	0-0.5	10.6 U	4.2	1.1 U	9.8	69.6	15.1	0.02 U	10.2	2.1 U	289		
	4800-010124-033	B-19	2.0	10.6 U	8.4	1.1 U	32.1	40.6	14.2	0.03	27.9	2.1 U	93.3		
	4800-010124-034	B-19	29.0	10.5 U	3.1	1.1 U	31.7	31.4	5.5	0.02	29.5	2.1 U	66.8		
	4800-010123-024	B-20	2.0	12.2 U	2.6	1.2 U	19.6	23.5	10.4	0.03	22.1	2.4 U	64.4		
	4800-010123-025	B-20	5.0	10.8 U	2.1	1.1 U	12.7	14.1	3.0	0.02 U	15.2	2.2 U	43.1		
	4800-010123-022	B-21	2.0	11.3 U	5.6	1.1 U	32.2	39.2	7.2	0.04	28.2	2.3 U	71.1		
	4800-010123-023	B-21	5.0	11 U	2.0	1.1 U	15.7	17.4	3.6	0.02	18.7	2.2 U	50.1		
	4800-010123-019	B-22	0-0.5	10.6 U	1.5	1.1 U	14.4	42.6	26.4	0.02 U	13.6	2.1 U	79.5		
	4800-010123-020	B-22	2.0	11.5 U	2.8	1.2 U	21.6	23.7	11	0.03	23.0	2.3 U	67.8		
	4800-010123-021	B-22	29.0	11.8 U	4.1	1.2 U	30.3	31	5.4	0.02 U	30.1	2.4 U	68.5		
	4800-010123-016	B-23	0-0.5	11.1 U	3.2	1.1 U	19.8	51.6	9.6	0.02	17.8	2.2 U	305		
	4800-010123-017	B-23	2.0	11.3 U	4.0	1.1 U	21.7	30	48.2	0.23	23.5	2.3 U	87.1		
	4800-010123-018	B-23	31.0	10.5 U	4.7	1.1 U	38.5	37.1	5.7	0.04	33.7	2.1 U	78.6		
	4800-010123-013	B-24	0-0.5	11.1 U	2.8	1.1 U	17.3	30.6	33.3	0.02	16.0	2.2 U	100		
	4800-010123-014	B-24	2.0	13.1 U	3.3	1.3 U	26.6	23	4.5	0.03	26.9	2.6 U	74.9		
	4800-010123-015	B-24	29.0	13.7 U	3.4	1.4 U	32.2	29.6	4.7	0.02	30.8	2.7 U	66.4		
	0800-010122-010	B-25	0-0.5	4.8	2.5	0.9 U	7.8	38.7	8.9	0.02 U	6.6	1.8 U	154		
	0800-010122-011	B-25	2.0	12.6 U	3.4	1.3 U	25.9	24.8	6.6	0.04	25.3	2.5 U	58		
	0800-010122-012	B-25	26.0	11.8 U	4.3	1.2 U	31.4	37	6.5	0.02	28.1	2.4 U	54.5		
	4800-010122-001	B-26	0-0.5	3.8	10	0.9 U	28.1	147	32.4	0.02 U	20.4	1.8 U	557		
	4800-010122-002	B-26	2.0	13.5 U	4.2	1.4 U	32.1	39.6	7.7	0.08	24.5	2.7 U	66.4		
	4800-010122-003	B-26	29.0	4.4	3.0	1 U	13.9	15.2	2.9	0.02 U	16.2	2 U	45.5		
	4800-010122-007	B-27	0-0.5	5.3	18.4	1.1 U	19.4	178	25.8	0.01	16.7	2.1 U	548		
	4800-010122-008	B-27	2.0	7.2	3.6	1.1 U	25.1	60.2	81.7	0.03	24.7	2.3 U	192		
	0800-010122-009	B-27	29.0	12 U	3.2	1.2 U	27.5	27.7	5.7	0.03	22.5	2.4 U	55.5		
	4800-010122-004	B-28	0-0.5	58.1	652	8.1	31.7	1,800	602	0.02	12.2	1.9	7,090		
	4800-010122-005	B-28	2.0	11.5 U	5.0	1.2 U	16.4	18.5	10	0.05	21.1	2.3 U	57.7		
	4800-010122-006	B-28	29.0	11.4 U	4.1	1.1 U	30.8	30.7	5.9	0.02	28.0	2.3 U	63.4		
	4800-011205-189	S-48	0-0.5	47.7	595	4.0	25.8	1,120	394	0.02 U	18.8	2.1 U	4,910		
	4800-011205-190	S-49	0-0.5	49.6	652	4.4	29.5	1,810	605	0.02	12.1	2.1 U	7,110		
	4800-011205-191	S-50	0-0.5	38.9	617	1.9	25.1	969	326	0.02 U	16.5	2.1 U	4,360		
	SIUF-RA1	RA1	1.0		95.7			259	84.2				1,160		
	SIUF-RA2	RA2	0-1		234										
	SIUF-RA2a-1.0	RA2a-1.0	0-1		25.2			95.4	30.6				331		
	SIUF-RA3	RA3	0-1		431										
	SIUF-RA3a-1.0	RA3a-1.0	0-1		26.6			79.6	24.6				216		
	SIUF-RA4	RA4	0-1		37.3			114	35.0				376		
	SIUF-RA5	RA5	0-1		41.2			174	58.2				641		
	S-51	S-51	0-0.5	2.11	21.0	0.34	16.6	79.2	33.9		17.5	1.74	388		

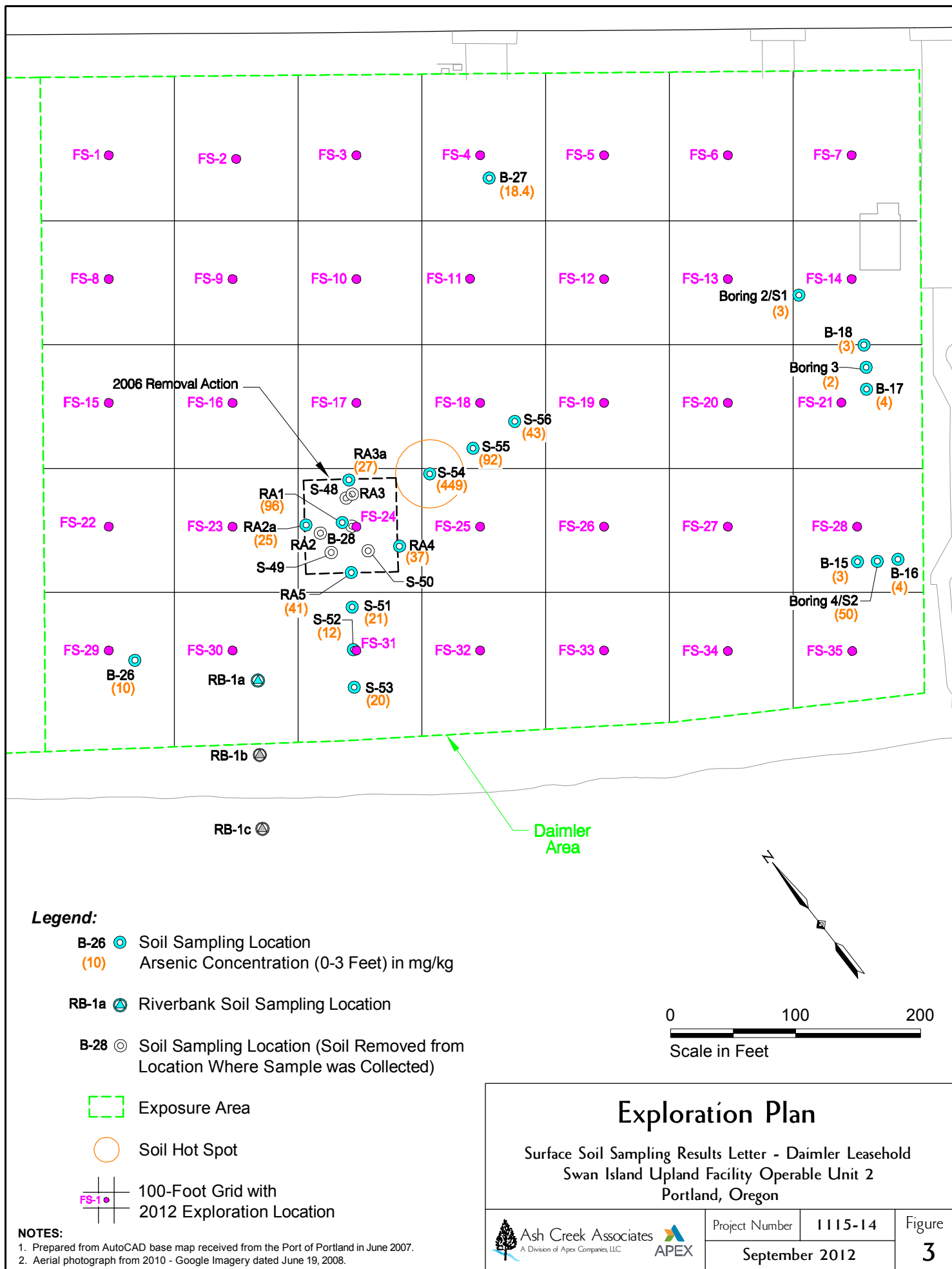
**Table 3**  
**Metal Concentrations in Soil (mg/kg)**  
**Swan Island Upland Facility - Operable Unit 2**

Area of Investigation	Sample No.	Sample Location	Sample Depth (ft)	Antimony	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc	Barium	Selenium
	S-52	S-52	0-0.5	2.22	12.2	0.31	20.2	135	41.9		69.8	0.16	253		
	S-53	S-53	0-0.5	4.15	20.2	0.31	23.5	135	87.3		20.0	0.09	393		
	S-54	S-54	0-0.5	73.2	449	3.74	28.1	1,770	580		14.2	1.56	7,410		
	S-55	S-55	0-0.5	14.2	91.6	0.60	17.9	381	120		12.8	0.31	1,320		
	S-56	S-56	0-0.5	7.99	42.6	0.70	16.5	249	60.8		16.0	0.25	859		
	4800-010123-026	S-1	0-0.5	10.7 U	3.2	1.1 U	15.8	48.2	13.7	0.02 U	16.2	2.2 U	231		
	4800-010123-027	S-2	0-0.5	10.9 U	3.9	1.1 U	23.1	60.4	68	0.06	21.7	2.2 U	238		
	4800-010123-028	S-3	0-0.5	10.9 U	4.4	1.3	29.4	172	18.2	0.02 U	20.9	2.2 U	1,100		
	4800-010123-029	S-4	0-0.5	10.5 U	3.0	1.1 U	13.4	55.5	10.8	0.02 U	14.2	2.1 U	263		
	4800-010123-030	S-5	0-0.5	11.2 U	3.0	1.1 U	17.6	61.7	36.2	0.08	19.2	2.2 U	137		
	4800-010123-031	S-6	0-0.5	11.1 U	5.5	1.1 U	19.7	141	33.7	0.02	17	2.2 U	262		
	PS-S-01-01	Boring 1	0-2		2.71	0.5 U	12.5	NA	11.6	0.1 U		0.5 U		81.3	0.5 U
	PS-S-01-02	Boring 1	16-18		1.6	0.5 U	10.5	NA	5 U	0.1 U		0.5 U		84.1	0.5 U
	PS-S-02-01	Boring 2	0-2		2.19	0.5 U	13.3	NA	12.6	0.1 U		0.5 U		104	0.5 U
	PS-S-02-02	Boring 2	20-22		2.73	0.5 U	10.5	NA	5 U	0.1 U		0.5 U		87.6	0.5 U
	PS-S-03-01	Boring 3	0-2		2.44	0.5 U	12.6	NA	10.6	0.1 U		0.5 U		114	0.5 U
	PS-S-03-02	Boring 3	16-18		2.77	0.5 U	20.9	NA	11.9	0.1 U		0.5 U		156	0.5 U
	PS-S-04-01	Boring 4	0-2		49.8	0.935	19.9	NA	267	0.1 U		0.5 U		172	0.5 U
	PS-S-04-02	Boring 4	16-18		3.02	0.5 U	13.7	NA	5.49	0.1 U		0.5 U		118	0.5 U
	PS-S-05-01	Boring 5	0-2		2.59	0.5 U	6.39	NA	5 U	0.1 U		0.5 U		36.8	0.5 U
	PS-S-05-02	Boring 5	16-18		2.14	0.5 U	12.3	NA	5 U	0.1 U		0.5 U		93.5	0.5 U
	PS-S-06-01	Boring 6	0-2		2.41	0.5 U	13.1	NA	36.9	0.1 U		0.5 U		131	0.5 U
	PS-S-06-02	Boring 6	16-18		2.27	0.5 U	16.2	NA	5.94	0.1 U		0.5 U		143	0.5 U
Rinker Stormwater Swale	RINK-001	RINK-001	Stockpile												
	RINK-002	RINK-002	Stockpile												
	RINK-003	RINK-003	Stockpile												
	RINK-004	RINK-004	Stockpile												
	RINK-005	RINK-005	Stockpile												
	RINK-006	RINK-006	Stockpile												
	RINK-007	RINK-007	Stockpile												
	RINK-008	RINK-008	Stockpile												
	Composite	RINK 001-004	Stockpile						668						
	Composite	RINK 005-008	Stockpile						48.9						
	RINK-009	RINK-009	3.0 - 3.5	1.65 U	4.07	0.963	28.9	150	256		20.4		505		
	RINK-010	RINK-010	3.0 - 3.5	2.03 U	2.68	0.677 U	27.0	29.6	7.42		23.8		276		
	RINK-011	RINK-011	4.5 - 5.0	1.57 U	1.93	0.524 U	13.9	13.8	2.15		19.2		43.6		
	RINK-012	RINK-012	4.5 - 5.0	2.10 U	2.42	0.699 U	25.8	23.1	4.54		23.8		60.1		
	RINK-013	RINK-013	4.5 - 5.0	1.66 U	4.39	0.554 U	15.3	17.6	2.73		20.6		42.7		
	RINK-014	RINK-014	3.0 - 3.5	1.60 U	2.91	0.533 U	20.4	36.1	17.9		20.5		72.6		
Stormwater Line Trench	RINK-015	RINK-015	Stockpile	1.58	4.89	0.613 U	21.1	91.1	493		19.4		330		

Soil removed from location where sample was collected

U = not detected

NC = no screening level





## ***Appendix B***

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### **Remediation Level Calculation**

Table B-1 - Arsenic Input Data for Remediation Level Calculation

Data			Data Sorted by Concentration (Highest First)		
Sample Name	Arsenic, 0-3 Ft, mg/kg	d_Arsenic, 0-3 Ft, mg/kg	Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
FS-1-1	4.42	1	FS-26-1	629	1
FS-1-2	2.97	1	S-54	449	1
FS-1-3	4.11	1	FS-24-1	136	1
FS-2-1	4.29	1	FS-32-1	122	1
FS-2-2	11.1	1	RA1	96	1
FS-2-3	2.56	1	S-55	92	1
FS-3-1	6.42	1	FS-25-1	58.2	1
FS-3-2	4.49	1	Boring 4/S2	50	1
FS-3-3	5.01	1	S-56	43	1
FS-4-1	4.59	1	RA5	41	1
FS-4-2	4.15	1	B-26	40	1
FS-4-3	5.28	1	FS-8-1	39.3	1
FS-5-1	4.1	1	RA4	37	1
FS-5-2	2.62	1	FS-30-1	29.3	1
FS-5-3	3.77	1	RA3a	27	1
FS-6-1	5.77	1	RA2a	25	1
FS-6-2	5.66	1	RB-8a	24.6	1
FS-6-3	3.91	1	RB-10b	24.1	1
FS-7-1	3.24	1	FS-9-1	23.8	1
FS-7-2	4.96	1	S-51	21	1
FS-7-3	3.69	1	S-53	20	1
FS-8-1	39.3	1	FS-33-1	19.6	1
FS-8-2	4.35	1	B-27	18.4	1
FS-8-3	4.8	1	FS-29-1	15.8	1
FS-9-1	23.8	1	FS-27-1	14	1
FS-9-2	3.38	1	FS-16-1	13.9	1
FS-9-3	3.16	1	S-52	12	1
FS-10-1	3.21	1	FS-34-1	11.6	1
FS-10-2	3.97	1	FS-2-2	11.1	1
FS-10-3	4	1	FS-31-1	8.43	1
FS-11-1	6.17	1	FS-31-3	7.73	1
FS-11-2	3.63	1	RB-9a	7	1
FS-11-3	3.89	1	FS-28-1	6.72	1
FS-12-1	2.21	1	RB-9b	6.7	1
FS-12-2	3.71	1	FS-3-1	6.42	1
FS-12-3	5.04	1	FS-22-1	6.27	1
FS-13-1	3.22	1	FS-18-3	6.26	0
FS-13-2	4.59	1	FS-34-2	6.21	1
FS-13-3	4.02	1	FS-11-1	6.17	1
FS-14-1	3.67	1	FS-6-1	5.77	1
FS-14-2	4.87	1	FS-25-3	5.77	1
FS-14-3	4.16	1	FS-6-2	5.66	1
FS-15-1	3.83	1	FS-26-3	5.62	0
FS-15-2	3.67	1	FS-23-2	5.59	0
FS-15-3	3.66	1	FS-23-3	5.48	0
FS-16-1	13.9	1	RB-10a	5.3	1
FS-16-2	2.61	1	FS-4-3	5.28	1
FS-16-3	4.42	1	FS-19-3	5.27	0
FS-17-1	4.13	1	FS-29-2	5.27	1
FS-17-2	3.47	1	FS-20-1	5.25	1
FS-17-3	3.72	1	FS-28-3	5.2	0
FS-18-1	2.3	1	FS-24-3	5.19	1
FS-18-2	2.8	1	FS-21-3	5.16	0
FS-18-3	6.26	0	FS-12-3	5.04	1
FS-19-1	4.49	0	FS-21-2	5.03	0

FS-19-2	4.46	0	FS-3-3	5.01	1
FS-19-3	5.27	0	FS-20-3	5.01	0
FS-20-1	5.25	1	FS-7-2	4.96	1
FS-20-2	4.58	0	FS-27-2	4.93	1
FS-20-3	5.01	0	FS-26-2	4.92	0
FS-21-1	4.21	0	FS-14-2	4.87	1
FS-21-2	5.03	0	FS-28-2	4.87	1
FS-21-3	5.16	0	FS-8-3	4.8	1
FS-22-1	6.27	1	FS-35-2	4.72	1
FS-22-2	4.04	0	FS-32-2	4.68	1
FS-22-3	4.21	0	FS-4-1	4.59	1
FS-23-1	3.87	1	FS-13-2	4.59	1
FS-23-2	5.59	0	FS-20-2	4.58	0
FS-23-3	5.48	0	FS-34-3	4.53	0
FS-24-1	136	1	FS-29-3	4.51	0
FS-24-2	2.15	1	FS-3-2	4.49	1
FS-24-3	5.19	1	FS-19-1	4.49	0
FS-25-1	58.2	1	FS-19-2	4.46	0
FS-25-2	3.55	1	FS-1-1	4.42	1
FS-25-3	5.77	1	FS-16-3	4.42	1
FS-26-1	629	1	FS-8-2	4.35	1
FS-26-2	4.92	0	FS-35-1	4.31	0
FS-26-3	5.62	0	FS-2-1	4.29	1
FS-27-1	14	1	FS-21-1	4.21	0
FS-27-2	4.93	1	FS-22-3	4.21	0
FS-27-3	3.99	0	FS-35-3	4.21	0
FS-28-1	6.72	1	FS-32-3	4.2	0
FS-28-2	4.87	1	FS-33-3	4.18	0
FS-28-3	5.2	0	FS-14-3	4.16	1
FS-29-1	15.8	1	FS-4-2	4.15	1
FS-29-2	5.27	1	FS-17-1	4.13	1
FS-29-3	4.51	0	FS-30-3	4.12	0
FS-30-1	29.3	1	FS-1-3	4.11	1
FS-30-2	4.11	0	FS-30-2	4.11	0
FS-30-3	4.12	0	FS-5-1	4.1	1
FS-31-1	8.43	1	FS-22-2	4.04	0
FS-31-2	3.7	1	FS-13-3	4.02	1
FS-31-3	7.73	1	FS-10-3	4	1
FS-32-1	122	1	B-16	4	1
FS-32-2	4.68	1	B-17	4	1
FS-32-3	4.2	0	FS-27-3	3.99	0
FS-33-1	19.6	1	FS-10-2	3.97	1
FS-33-2	3	1	FS-6-3	3.91	1
FS-33-3	4.18	0	FS-11-3	3.89	1
FS-34-1	11.6	1	FS-23-1	3.87	1
FS-34-2	6.21	1	FS-15-1	3.83	1
FS-34-3	4.53	0	FS-5-3	3.77	1
FS-35-1	4.31	0	FS-17-3	3.72	1
FS-35-2	4.72	1	FS-12-2	3.71	1
FS-35-3	4.21	0	FS-31-2	3.7	1
S-51	21	1	RB-8b	3.7	1
S-52	12	1	FS-7-3	3.69	1
S-53	20	1	FS-14-1	3.67	1
S-54	449	1	FS-15-2	3.67	1
S-55	92	1	FS-15-3	3.66	1
S-56	43	1	FS-11-2	3.63	1
RA1	96	1	FS-25-2	3.55	1
RA2a	25	1	FS-17-2	3.47	1
RA3a	27	1	FS-9-2	3.38	1
RA4	37	1	FS-7-1	3.24	1
RA5	41	1	FS-13-1	3.22	1
B-15	3	1	FS-10-1	3.21	1

B-16	4	1	FS-9-3	3.16	1
B-17	4	1	FS-33-2	3	1
B-18	3	1	B-15	3	1
B-26	40	1	B-18	3	1
B-27	18.4	1	Boring 2/S1	3	1
Boring 2/S1	3	1	FS-1-2	2.97	1
Boring 3	2	1	FS-18-2	2.8	1
Boring 4/S2	50	1	FS-5-2	2.62	1
RB-8a	24.6	1	FS-16-2	2.61	1
RB-8b	3.7	1	FS-2-3	2.56	1
RB-9a	7	1	FS-18-1	2.3	1
RB-9b	6.7	1	FS-12-1	2.21	1
RB-10a	5.3	1	FS-24-2	2.15	1
RB-10b	24.1	1	Boring 3	2	1

Note: In "d\_" column, 1 = detected, 0 = not detected at detection limit of value shown

Remove Highest Concentration, One at a Time			Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg	Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
S-54	449	1	FS-24-1	136	1
FS-24-1	136	1	FS-32-1	122	1
FS-32-1	122	1	RA1	96	1
RA1	96	1	S-55	92	1
S-55	92	1	FS-25-1	58.2	1
FS-25-1	58.2	1	Boring 4/S2	50	1
Boring 4/S2	50	1	S-56	43	1
S-56	43	1	RA5	41	1
RA5	41	1	B-26	40	1
B-26	40	1	FS-8-1	39.3	1
FS-8-1	39.3	1	RA4	37	1
RA4	37	1	FS-30-1	29.3	1
FS-30-1	29.3	1	RA3a	27	1
RA3a	27	1	RA2a	25	1
RA2a	25	1	RB-8a	24.6	1
RB-8a	24.6	1	RB-10b	24.1	1
RB-10b	24.1	1	FS-9-1	23.8	1
FS-9-1	23.8	1	S-51	21	1
S-51	21	1	S-53	20	1
S-53	20	1	FS-33-1	19.6	1
FS-33-1	19.6	1	B-27	18.4	1
B-27	18.4	1	FS-29-1	15.8	1
FS-29-1	15.8	1	FS-27-1	14	1
FS-27-1	14	1	FS-16-1	13.9	1
FS-16-1	13.9	1	S-52	12	1
S-52	12	1	FS-34-1	11.6	1
FS-34-1	11.6	1	FS-2-2	11.1	1
FS-2-2	11.1	1	FS-31-1	8.43	1
FS-31-1	8.43	1	FS-31-3	7.73	1
FS-31-3	7.73	1	RB-9a	7	1
RB-9a	7	1	FS-28-1	6.72	1
FS-28-1	6.72	1	RB-9b	6.7	1
RB-9b	6.7	1	FS-3-1	6.42	1
FS-3-1	6.42	1	FS-22-1	6.27	1
FS-22-1	6.27	1	FS-18-3	6.26	0
FS-18-3	6.26	0	FS-34-2	6.21	1
FS-34-2	6.21	1	FS-11-1	6.17	1
FS-11-1	6.17	1	FS-6-1	5.77	1
FS-6-1	5.77	1	FS-25-3	5.77	1
FS-25-3	5.77	1	FS-6-2	5.66	1
FS-6-2	5.66	1	FS-26-3	5.62	0
FS-26-3	5.62	0	FS-23-2	5.59	0
FS-23-2	5.59	0	FS-23-3	5.48	0
FS-23-3	5.48	0	RB-10a	5.3	1
RB-10a	5.3	1	FS-4-3	5.28	1
FS-4-3	5.28	1	FS-19-3	5.27	0
FS-19-3	5.27	0	FS-29-2	5.27	1
FS-29-2	5.27	1	FS-20-1	5.25	1
FS-20-1	5.25	1	FS-28-3	5.2	0
FS-28-3	5.2	0	FS-24-3	5.19	1
FS-24-3	5.19	1	FS-21-3	5.16	0
FS-21-3	5.16	0	FS-12-3	5.04	1
FS-12-3	5.04	1	FS-21-2	5.03	0
FS-21-2	5.03	0	FS-3-3	5.01	1
FS-3-3	5.01	1	FS-20-3	5.01	0

FS-20-3	5.01	0	FS-7-2	4.96	1
FS-7-2	4.96	1	FS-27-2	4.93	1
FS-27-2	4.93	1	FS-26-2	4.92	0
FS-26-2	4.92	0	FS-14-2	4.87	1
FS-14-2	4.87	1	FS-28-2	4.87	1
FS-28-2	4.87	1	FS-8-3	4.8	1
FS-8-3	4.8	1	FS-35-2	4.72	1
FS-35-2	4.72	1	FS-32-2	4.68	1
FS-32-2	4.68	1	FS-4-1	4.59	1
FS-4-1	4.59	1	FS-13-2	4.59	1
FS-13-2	4.59	1	FS-20-2	4.58	0
FS-20-2	4.58	0	FS-34-3	4.53	0
FS-34-3	4.53	0	FS-29-3	4.51	0
FS-29-3	4.51	0	FS-3-2	4.49	1
FS-3-2	4.49	1	FS-19-1	4.49	0
FS-19-1	4.49	0	FS-19-2	4.46	0
FS-19-2	4.46	0	FS-1-1	4.42	1
FS-1-1	4.42	1	FS-16-3	4.42	1
FS-16-3	4.42	1	FS-8-2	4.35	1
FS-8-2	4.35	1	FS-35-1	4.31	0
FS-35-1	4.31	0	FS-2-1	4.29	1
FS-2-1	4.29	1	FS-21-1	4.21	0
FS-21-1	4.21	0	FS-22-3	4.21	0
FS-22-3	4.21	0	FS-35-3	4.21	0
FS-35-3	4.21	0	FS-32-3	4.2	0
FS-32-3	4.2	0	FS-33-3	4.18	0
FS-33-3	4.18	0	FS-14-3	4.16	1
FS-14-3	4.16	1	FS-4-2	4.15	1
FS-4-2	4.15	1	FS-17-1	4.13	1
FS-17-1	4.13	1	FS-30-3	4.12	0
FS-30-3	4.12	0	FS-1-3	4.11	1
FS-1-3	4.11	1	FS-30-2	4.11	0
FS-30-2	4.11	0	FS-5-1	4.1	1
FS-5-1	4.1	1	FS-22-2	4.04	0
FS-22-2	4.04	0	FS-13-3	4.02	1
FS-13-3	4.02	1	FS-10-3	4	1
FS-10-3	4	1	B-16	4	1
B-16	4	1	B-17	4	1
B-17	4	1	FS-27-3	3.99	0
FS-27-3	3.99	0	FS-10-2	3.97	1
FS-10-2	3.97	1	FS-6-3	3.91	1
FS-6-3	3.91	1	FS-11-3	3.89	1
FS-11-3	3.89	1	FS-23-1	3.87	1
FS-23-1	3.87	1	FS-15-1	3.83	1
FS-15-1	3.83	1	FS-5-3	3.77	1
FS-5-3	3.77	1	FS-17-3	3.72	1
FS-17-3	3.72	1	FS-12-2	3.71	1
FS-12-2	3.71	1	FS-31-2	3.7	1
FS-31-2	3.7	1	RB-8b	3.7	1
RB-8b	3.7	1	FS-7-3	3.69	1
FS-7-3	3.69	1	FS-14-1	3.67	1
FS-14-1	3.67	1	FS-15-2	3.67	1
FS-15-2	3.67	1	FS-15-3	3.66	1
FS-15-3	3.66	1	FS-11-2	3.63	1
FS-11-2	3.63	1	FS-25-2	3.55	1
FS-25-2	3.55	1	FS-17-2	3.47	1
FS-17-2	3.47	1	FS-9-2	3.38	1
FS-9-2	3.38	1	FS-7-1	3.24	1
FS-7-1	3.24	1	FS-13-1	3.22	1
FS-13-1	3.22	1	FS-10-1	3.21	1
FS-10-1	3.21	1	FS-9-3	3.16	1
FS-9-3	3.16	1	FS-33-2	3	1

FS-33-2	3	1	B-15	3	1
B-15	3	1	B-18	3	1
B-18	3	1	Boring 2/S1	3	1
Boring 2/S1	3	1	FS-1-2	2.97	1
FS-1-2	2.97	1	FS-18-2	2.8	1
FS-18-2	2.8	1	FS-5-2	2.62	1
FS-5-2	2.62	1	FS-16-2	2.61	1
FS-16-2	2.61	1	FS-2-3	2.56	1
FS-2-3	2.56	1	FS-18-1	2.3	1
FS-18-1	2.3	1	FS-12-1	2.21	1
FS-12-1	2.21	1	FS-24-2	2.15	1
FS-24-2	2.15	1	Boring 3	2	1
Boring 3	2	1			

Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
FS-32-1	122	1
RA1	96	1
S-55	92	1
FS-25-1	58.2	1
Boring 4/S2	50	1
S-56	43	1
RA5	41	1
B-26	40	1
FS-8-1	39.3	1
RA4	37	1
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1

Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
RA1	96	1
S-55	92	1
FS-25-1	58.2	1
Boring 4/S2	50	1
S-56	43	1
RA5	41	1
B-26	40	1
FS-8-1	39.3	1
RA4	37	1
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1



FS-27-2	4.93	1	FS-26-2	4.92	0
FS-26-2	4.92	0	FS-14-2	4.87	1
FS-14-2	4.87	1	FS-28-2	4.87	1
FS-28-2	4.87	1	FS-8-3	4.8	1
FS-8-3	4.8	1	FS-35-2	4.72	1
FS-35-2	4.72	1	FS-32-2	4.68	1
FS-32-2	4.68	1	FS-4-1	4.59	1
FS-4-1	4.59	1	FS-13-2	4.59	1
FS-13-2	4.59	1	FS-20-2	4.58	0
FS-20-2	4.58	0	FS-34-3	4.53	0
FS-34-3	4.53	0	FS-29-3	4.51	0
FS-29-3	4.51	0	FS-3-2	4.49	1
FS-3-2	4.49	1	FS-19-1	4.49	0
FS-19-1	4.49	0	FS-19-2	4.46	0
FS-19-2	4.46	0	FS-1-1	4.42	1
FS-1-1	4.42	1	FS-16-3	4.42	1
FS-16-3	4.42	1	FS-8-2	4.35	1
FS-8-2	4.35	1	FS-35-1	4.31	0
FS-35-1	4.31	0	FS-2-1	4.29	1
FS-2-1	4.29	1	FS-21-1	4.21	0
FS-21-1	4.21	0	FS-22-3	4.21	0
FS-22-3	4.21	0	FS-35-3	4.21	0
FS-35-3	4.21	0	FS-32-3	4.2	0
FS-32-3	4.2	0	FS-33-3	4.18	0
FS-33-3	4.18	0	FS-14-3	4.16	1
FS-14-3	4.16	1	FS-4-2	4.15	1
FS-4-2	4.15	1	FS-17-1	4.13	1
FS-17-1	4.13	1	FS-30-3	4.12	0
FS-30-3	4.12	0	FS-1-3	4.11	1
FS-1-3	4.11	1	FS-30-2	4.11	0
FS-30-2	4.11	0	FS-5-1	4.1	1
FS-5-1	4.1	1	FS-22-2	4.04	0
FS-22-2	4.04	0	FS-13-3	4.02	1
FS-13-3	4.02	1	FS-10-3	4	1
FS-10-3	4	1	B-16	4	1
B-16	4	1	B-17	4	1
B-17	4	1	FS-27-3	3.99	0
FS-27-3	3.99	0	FS-10-2	3.97	1
FS-10-2	3.97	1	FS-6-3	3.91	1
FS-6-3	3.91	1	FS-11-3	3.89	1
FS-11-3	3.89	1	FS-23-1	3.87	1
FS-23-1	3.87	1	FS-15-1	3.83	1
FS-15-1	3.83	1	FS-5-3	3.77	1
FS-5-3	3.77	1	FS-17-3	3.72	1
FS-17-3	3.72	1	FS-12-2	3.71	1
FS-12-2	3.71	1	FS-31-2	3.7	1
FS-31-2	3.7	1	RB-8b	3.7	1
RB-8b	3.7	1	FS-7-3	3.69	1
FS-7-3	3.69	1	FS-14-1	3.67	1
FS-14-1	3.67	1	FS-15-2	3.67	1
FS-15-2	3.67	1	FS-15-3	3.66	1
FS-15-3	3.66	1	FS-11-2	3.63	1
FS-11-2	3.63	1	FS-25-2	3.55	1
FS-25-2	3.55	1	FS-17-2	3.47	1
FS-17-2	3.47	1	FS-9-2	3.38	1
FS-9-2	3.38	1	FS-7-1	3.24	1
FS-7-1	3.24	1	FS-13-1	3.22	1
FS-13-1	3.22	1	FS-10-1	3.21	1
FS-10-1	3.21	1	FS-9-3	3.16	1
FS-9-3	3.16	1	FS-33-2	3	1
FS-33-2	3	1	B-15	3	1
B-15	3	1	B-18	3	1

B-18	3	1	Boring 2/S1	3	1
Boring 2/S1	3	1	FS-1-2	2.97	1
FS-1-2	2.97	1	FS-18-2	2.8	1
FS-18-2	2.8	1	FS-5-2	2.62	1
FS-5-2	2.62	1	FS-16-2	2.61	1
FS-16-2	2.61	1	FS-2-3	2.56	1
FS-2-3	2.56	1	FS-18-1	2.3	1
FS-18-1	2.3	1	FS-12-1	2.21	1
FS-12-1	2.21	1	FS-24-2	2.15	1
FS-24-2	2.15	1	Boring 3	2	1
Boring 3	2	1			

## Remove Highest Concentration, One at a Time

Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
S-55	92	1
FS-25-1	58.2	1
Boring 4/S2	50	1
S-56	43	1
RA5	41	1
B-26	40	1
FS-8-1	39.3	1
RA4	37	1
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-26-2	4.92	0

## Remove Highest Concentration, One at a Time

Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
FS-25-1	58.2	1
Boring 4/S2	50	1
S-56	43	1
RA5	41	1
B-26	40	1
FS-8-1	39.3	1
RA4	37	1
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1

FS-14-2	4.87	1	FS-28-2	4.87	1
FS-28-2	4.87	1	FS-8-3	4.8	1
FS-8-3	4.8	1	FS-35-2	4.72	1
FS-35-2	4.72	1	FS-32-2	4.68	1
FS-32-2	4.68	1	FS-4-1	4.59	1
FS-4-1	4.59	1	FS-13-2	4.59	1
FS-13-2	4.59	1	FS-20-2	4.58	0
FS-20-2	4.58	0	FS-34-3	4.53	0
FS-34-3	4.53	0	FS-29-3	4.51	0
FS-29-3	4.51	0	FS-3-2	4.49	1
FS-3-2	4.49	1	FS-19-1	4.49	0
FS-19-1	4.49	0	FS-19-2	4.46	0
FS-19-2	4.46	0	FS-1-1	4.42	1
FS-1-1	4.42	1	FS-16-3	4.42	1
FS-16-3	4.42	1	FS-8-2	4.35	1
FS-8-2	4.35	1	FS-35-1	4.31	0
FS-35-1	4.31	0	FS-2-1	4.29	1
FS-2-1	4.29	1	FS-21-1	4.21	0
FS-21-1	4.21	0	FS-22-3	4.21	0
FS-22-3	4.21	0	FS-35-3	4.21	0
FS-35-3	4.21	0	FS-32-3	4.2	0
FS-32-3	4.2	0	FS-33-3	4.18	0
FS-33-3	4.18	0	FS-14-3	4.16	1
FS-14-3	4.16	1	FS-4-2	4.15	1
FS-4-2	4.15	1	FS-17-1	4.13	1
FS-17-1	4.13	1	FS-30-3	4.12	0
FS-30-3	4.12	0	FS-1-3	4.11	1
FS-1-3	4.11	1	FS-30-2	4.11	0
FS-30-2	4.11	0	FS-5-1	4.1	1
FS-5-1	4.1	1	FS-22-2	4.04	0
FS-22-2	4.04	0	FS-13-3	4.02	1
FS-13-3	4.02	1	FS-10-3	4	1
FS-10-3	4	1	B-16	4	1
B-16	4	1	B-17	4	1
B-17	4	1	FS-27-3	3.99	0
FS-27-3	3.99	0	FS-10-2	3.97	1
FS-10-2	3.97	1	FS-6-3	3.91	1
FS-6-3	3.91	1	FS-11-3	3.89	1
FS-11-3	3.89	1	FS-23-1	3.87	1
FS-23-1	3.87	1	FS-15-1	3.83	1
FS-15-1	3.83	1	FS-5-3	3.77	1
FS-5-3	3.77	1	FS-17-3	3.72	1
FS-17-3	3.72	1	FS-12-2	3.71	1
FS-12-2	3.71	1	FS-31-2	3.7	1
FS-31-2	3.7	1	RB-8b	3.7	1
RB-8b	3.7	1	FS-7-3	3.69	1
FS-7-3	3.69	1	FS-14-1	3.67	1
FS-14-1	3.67	1	FS-15-2	3.67	1
FS-15-2	3.67	1	FS-15-3	3.66	1
FS-15-3	3.66	1	FS-11-2	3.63	1
FS-11-2	3.63	1	FS-25-2	3.55	1
FS-25-2	3.55	1	FS-17-2	3.47	1
FS-17-2	3.47	1	FS-9-2	3.38	1
FS-9-2	3.38	1	FS-7-1	3.24	1
FS-7-1	3.24	1	FS-13-1	3.22	1
FS-13-1	3.22	1	FS-10-1	3.21	1
FS-10-1	3.21	1	FS-9-3	3.16	1
FS-9-3	3.16	1	FS-33-2	3	1
FS-33-2	3	1	B-15	3	1
B-15	3	1	B-18	3	1
B-18	3	1	Boring 2/S1	3	1
Boring 2/S1	3	1	FS-1-2	2.97	1

FS-1-2	2.97	1	FS-18-2	2.8	1
FS-18-2	2.8	1	FS-5-2	2.62	1
FS-5-2	2.62	1	FS-16-2	2.61	1
FS-16-2	2.61	1	FS-2-3	2.56	1
FS-2-3	2.56	1	FS-18-1	2.3	1
FS-18-1	2.3	1	FS-12-1	2.21	1
FS-12-1	2.21	1	FS-24-2	2.15	1
FS-24-2	2.15	1	Boring 3	2	1
Boring 3	2	1			

Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
Boring 4/S2	50	1
S-56	43	1
RA5	41	1
B-26	40	1
FS-8-1	39.3	1
RA4	37	1
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1

Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
S-56	43	1
RA5	41	1
B-26	40	1
FS-8-1	39.3	1
RA4	37	1
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1

FS-8-3	4.8	1	FS-35-2	4.72	1
FS-35-2	4.72	1	FS-32-2	4.68	1
FS-32-2	4.68	1	FS-4-1	4.59	1
FS-4-1	4.59	1	FS-13-2	4.59	1
FS-13-2	4.59	1	FS-20-2	4.58	0
FS-20-2	4.58	0	FS-34-3	4.53	0
FS-34-3	4.53	0	FS-29-3	4.51	0
FS-29-3	4.51	0	FS-3-2	4.49	1
FS-3-2	4.49	1	FS-19-1	4.49	0
FS-19-1	4.49	0	FS-19-2	4.46	0
FS-19-2	4.46	0	FS-1-1	4.42	1
FS-1-1	4.42	1	FS-16-3	4.42	1
FS-16-3	4.42	1	FS-8-2	4.35	1
FS-8-2	4.35	1	FS-35-1	4.31	0
FS-35-1	4.31	0	FS-2-1	4.29	1
FS-2-1	4.29	1	FS-21-1	4.21	0
FS-21-1	4.21	0	FS-22-3	4.21	0
FS-22-3	4.21	0	FS-35-3	4.21	0
FS-35-3	4.21	0	FS-32-3	4.2	0
FS-32-3	4.2	0	FS-33-3	4.18	0
FS-33-3	4.18	0	FS-14-3	4.16	1
FS-14-3	4.16	1	FS-4-2	4.15	1
FS-4-2	4.15	1	FS-17-1	4.13	1
FS-17-1	4.13	1	FS-30-3	4.12	0
FS-30-3	4.12	0	FS-1-3	4.11	1
FS-1-3	4.11	1	FS-30-2	4.11	0
FS-30-2	4.11	0	FS-5-1	4.1	1
FS-5-1	4.1	1	FS-22-2	4.04	0
FS-22-2	4.04	0	FS-13-3	4.02	1
FS-13-3	4.02	1	FS-10-3	4	1
FS-10-3	4	1	B-16	4	1
B-16	4	1	B-17	4	1
B-17	4	1	FS-27-3	3.99	0
FS-27-3	3.99	0	FS-10-2	3.97	1
FS-10-2	3.97	1	FS-6-3	3.91	1
FS-6-3	3.91	1	FS-11-3	3.89	1
FS-11-3	3.89	1	FS-23-1	3.87	1
FS-23-1	3.87	1	FS-15-1	3.83	1
FS-15-1	3.83	1	FS-5-3	3.77	1
FS-5-3	3.77	1	FS-17-3	3.72	1
FS-17-3	3.72	1	FS-12-2	3.71	1
FS-12-2	3.71	1	FS-31-2	3.7	1
FS-31-2	3.7	1	RB-8b	3.7	1
RB-8b	3.7	1	FS-7-3	3.69	1
FS-7-3	3.69	1	FS-14-1	3.67	1
FS-14-1	3.67	1	FS-15-2	3.67	1
FS-15-2	3.67	1	FS-15-3	3.66	1
FS-15-3	3.66	1	FS-11-2	3.63	1
FS-11-2	3.63	1	FS-25-2	3.55	1
FS-25-2	3.55	1	FS-17-2	3.47	1
FS-17-2	3.47	1	FS-9-2	3.38	1
FS-9-2	3.38	1	FS-7-1	3.24	1
FS-7-1	3.24	1	FS-13-1	3.22	1
FS-13-1	3.22	1	FS-10-1	3.21	1
FS-10-1	3.21	1	FS-9-3	3.16	1
FS-9-3	3.16	1	FS-33-2	3	1
FS-33-2	3	1	B-15	3	1
B-15	3	1	B-18	3	1
B-18	3	1	Boring 2/S1	3	1
Boring 2/S1	3	1	FS-1-2	2.97	1
FS-1-2	2.97	1	FS-18-2	2.8	1
FS-18-2	2.8	1	FS-5-2	2.62	1

FS-5-2	2.62	1	FS-16-2	2.61	1
FS-16-2	2.61	1	FS-2-3	2.56	1
FS-2-3	2.56	1	FS-18-1	2.3	1
FS-18-1	2.3	1	FS-12-1	2.21	1
FS-12-1	2.21	1	FS-24-2	2.15	1
FS-24-2	2.15	1	Boring 3	2	1
Boring 3	2	1			



## Remove Highest Concentration, One at a Time

Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
RA5	41	1
B-26	40	1
FS-8-1	39.3	1
RA4	37	1
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1
FS-35-2	4.72	1

## Remove Highest Concentration, One at a Time

Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
B-26	40	1
FS-8-1	39.3	1
RA4	37	1
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1
FS-35-2	4.72	1
FS-32-2	4.68	1

FS-32-2	4.68	1	FS-4-1	4.59	1
FS-4-1	4.59	1	FS-13-2	4.59	1
FS-13-2	4.59	1	FS-20-2	4.58	0
FS-20-2	4.58	0	FS-34-3	4.53	0
FS-34-3	4.53	0	FS-29-3	4.51	0
FS-29-3	4.51	0	FS-3-2	4.49	1
FS-3-2	4.49	1	FS-19-1	4.49	0
FS-19-1	4.49	0	FS-19-2	4.46	0
FS-19-2	4.46	0	FS-1-1	4.42	1
FS-1-1	4.42	1	FS-16-3	4.42	1
FS-16-3	4.42	1	FS-8-2	4.35	1
FS-8-2	4.35	1	FS-35-1	4.31	0
FS-35-1	4.31	0	FS-2-1	4.29	1
FS-2-1	4.29	1	FS-21-1	4.21	0
FS-21-1	4.21	0	FS-22-3	4.21	0
FS-22-3	4.21	0	FS-35-3	4.21	0
FS-35-3	4.21	0	FS-32-3	4.2	0
FS-32-3	4.2	0	FS-33-3	4.18	0
FS-33-3	4.18	0	FS-14-3	4.16	1
FS-14-3	4.16	1	FS-4-2	4.15	1
FS-4-2	4.15	1	FS-17-1	4.13	1
FS-17-1	4.13	1	FS-30-3	4.12	0
FS-30-3	4.12	0	FS-1-3	4.11	1
FS-1-3	4.11	1	FS-30-2	4.11	0
FS-30-2	4.11	0	FS-5-1	4.1	1
FS-5-1	4.1	1	FS-22-2	4.04	0
FS-22-2	4.04	0	FS-13-3	4.02	1
FS-13-3	4.02	1	FS-10-3	4	1
FS-10-3	4	1	B-16	4	1
B-16	4	1	B-17	4	1
B-17	4	1	FS-27-3	3.99	0
FS-27-3	3.99	0	FS-10-2	3.97	1
FS-10-2	3.97	1	FS-6-3	3.91	1
FS-6-3	3.91	1	FS-11-3	3.89	1
FS-11-3	3.89	1	FS-23-1	3.87	1
FS-23-1	3.87	1	FS-15-1	3.83	1
FS-15-1	3.83	1	FS-5-3	3.77	1
FS-5-3	3.77	1	FS-17-3	3.72	1
FS-17-3	3.72	1	FS-12-2	3.71	1
FS-12-2	3.71	1	FS-31-2	3.7	1
FS-31-2	3.7	1	RB-8b	3.7	1
RB-8b	3.7	1	FS-7-3	3.69	1
FS-7-3	3.69	1	FS-14-1	3.67	1
FS-14-1	3.67	1	FS-15-2	3.67	1
FS-15-2	3.67	1	FS-15-3	3.66	1
FS-15-3	3.66	1	FS-11-2	3.63	1
FS-11-2	3.63	1	FS-25-2	3.55	1
FS-25-2	3.55	1	FS-17-2	3.47	1
FS-17-2	3.47	1	FS-9-2	3.38	1
FS-9-2	3.38	1	FS-7-1	3.24	1
FS-7-1	3.24	1	FS-13-1	3.22	1
FS-13-1	3.22	1	FS-10-1	3.21	1
FS-10-1	3.21	1	FS-9-3	3.16	1
FS-9-3	3.16	1	FS-33-2	3	1
FS-33-2	3	1	B-15	3	1
B-15	3	1	B-18	3	1
B-18	3	1	Boring 2/S1	3	1
Boring 2/S1	3	1	FS-1-2	2.97	1
FS-1-2	2.97	1	FS-18-2	2.8	1
FS-18-2	2.8	1	FS-5-2	2.62	1
FS-5-2	2.62	1	FS-16-2	2.61	1
FS-16-2	2.61	1	FS-2-3	2.56	1

FS-2-3	2.56	1	FS-18-1	2.3	1
FS-18-1	2.3	1	FS-12-1	2.21	1
FS-12-1	2.21	1	FS-24-2	2.15	1
FS-24-2	2.15	1	Boring 3	2	1
Boring 3	2	1			

Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
FS-8-1	39.3	1
RA4	37	1
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1
FS-35-2	4.72	1
FS-32-2	4.68	1
FS-4-1	4.59	1

Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
RA4	37	1
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1
FS-35-2	4.72	1
FS-32-2	4.68	1
FS-4-1	4.59	1
FS-13-2	4.59	1

FS-13-2	4.59	1	FS-20-2	4.58	0
FS-20-2	4.58	0	FS-34-3	4.53	0
FS-34-3	4.53	0	FS-29-3	4.51	0
FS-29-3	4.51	0	FS-3-2	4.49	1
FS-3-2	4.49	1	FS-19-1	4.49	0
FS-19-1	4.49	0	FS-19-2	4.46	0
FS-19-2	4.46	0	FS-1-1	4.42	1
FS-1-1	4.42	1	FS-16-3	4.42	1
FS-16-3	4.42	1	FS-8-2	4.35	1
FS-8-2	4.35	1	FS-35-1	4.31	0
FS-35-1	4.31	0	FS-2-1	4.29	1
FS-2-1	4.29	1	FS-21-1	4.21	0
FS-21-1	4.21	0	FS-22-3	4.21	0
FS-22-3	4.21	0	FS-35-3	4.21	0
FS-35-3	4.21	0	FS-32-3	4.2	0
FS-32-3	4.2	0	FS-33-3	4.18	0
FS-33-3	4.18	0	FS-14-3	4.16	1
FS-14-3	4.16	1	FS-4-2	4.15	1
FS-4-2	4.15	1	FS-17-1	4.13	1
FS-17-1	4.13	1	FS-30-3	4.12	0
FS-30-3	4.12	0	FS-1-3	4.11	1
FS-1-3	4.11	1	FS-30-2	4.11	0
FS-30-2	4.11	0	FS-5-1	4.1	1
FS-5-1	4.1	1	FS-22-2	4.04	0
FS-22-2	4.04	0	FS-13-3	4.02	1
FS-13-3	4.02	1	FS-10-3	4	1
FS-10-3	4	1	B-16	4	1
B-16	4	1	B-17	4	1
B-17	4	1	FS-27-3	3.99	0
FS-27-3	3.99	0	FS-10-2	3.97	1
FS-10-2	3.97	1	FS-6-3	3.91	1
FS-6-3	3.91	1	FS-11-3	3.89	1
FS-11-3	3.89	1	FS-23-1	3.87	1
FS-23-1	3.87	1	FS-15-1	3.83	1
FS-15-1	3.83	1	FS-5-3	3.77	1
FS-5-3	3.77	1	FS-17-3	3.72	1
FS-17-3	3.72	1	FS-12-2	3.71	1
FS-12-2	3.71	1	FS-31-2	3.7	1
FS-31-2	3.7	1	RB-8b	3.7	1
RB-8b	3.7	1	FS-7-3	3.69	1
FS-7-3	3.69	1	FS-14-1	3.67	1
FS-14-1	3.67	1	FS-15-2	3.67	1
FS-15-2	3.67	1	FS-15-3	3.66	1
FS-15-3	3.66	1	FS-11-2	3.63	1
FS-11-2	3.63	1	FS-25-2	3.55	1
FS-25-2	3.55	1	FS-17-2	3.47	1
FS-17-2	3.47	1	FS-9-2	3.38	1
FS-9-2	3.38	1	FS-7-1	3.24	1
FS-7-1	3.24	1	FS-13-1	3.22	1
FS-13-1	3.22	1	FS-10-1	3.21	1
FS-10-1	3.21	1	FS-9-3	3.16	1
FS-9-3	3.16	1	FS-33-2	3	1
FS-33-2	3	1	B-15	3	1
B-15	3	1	B-18	3	1
B-18	3	1	Boring 2/S1	3	1
Boring 2/S1	3	1	FS-1-2	2.97	1
FS-1-2	2.97	1	FS-18-2	2.8	1
FS-18-2	2.8	1	FS-5-2	2.62	1
FS-5-2	2.62	1	FS-16-2	2.61	1
FS-16-2	2.61	1	FS-2-3	2.56	1
FS-2-3	2.56	1	FS-18-1	2.3	1
FS-18-1	2.3	1	FS-12-1	2.21	1

FS-12-1	2.21	1	FS-24-2	2.15	1
FS-24-2	2.15	1	Boring 3	2	1
Boring 3	2	1			

Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
FS-30-1	29.3	1
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1
FS-35-2	4.72	1
FS-32-2	4.68	1
FS-4-1	4.59	1
FS-13-2	4.59	1
FS-20-2	4.58	0
FS-20-2	4.58	0

Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
RA3a	27	1
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1
FS-35-2	4.72	1
FS-32-2	4.68	1
FS-4-1	4.59	1
FS-13-2	4.59	1
FS-20-2	4.58	0
FS-34-3	4.53	0

FS-34-3	4.53	0	FS-29-3	4.51	0
FS-29-3	4.51	0	FS-3-2	4.49	1
FS-3-2	4.49	1	FS-19-1	4.49	0
FS-19-1	4.49	0	FS-19-2	4.46	0
FS-19-2	4.46	0	FS-1-1	4.42	1
FS-1-1	4.42	1	FS-16-3	4.42	1
FS-16-3	4.42	1	FS-8-2	4.35	1
FS-8-2	4.35	1	FS-35-1	4.31	0
FS-35-1	4.31	0	FS-2-1	4.29	1
FS-2-1	4.29	1	FS-21-1	4.21	0
FS-21-1	4.21	0	FS-22-3	4.21	0
FS-22-3	4.21	0	FS-35-3	4.21	0
FS-35-3	4.21	0	FS-32-3	4.2	0
FS-32-3	4.2	0	FS-33-3	4.18	0
FS-33-3	4.18	0	FS-14-3	4.16	1
FS-14-3	4.16	1	FS-4-2	4.15	1
FS-4-2	4.15	1	FS-17-1	4.13	1
FS-17-1	4.13	1	FS-30-3	4.12	0
FS-30-3	4.12	0	FS-1-3	4.11	1
FS-1-3	4.11	1	FS-30-2	4.11	0
FS-30-2	4.11	0	FS-5-1	4.1	1
FS-5-1	4.1	1	FS-22-2	4.04	0
FS-22-2	4.04	0	FS-13-3	4.02	1
FS-13-3	4.02	1	FS-10-3	4	1
FS-10-3	4	1	B-16	4	1
B-16	4	1	B-17	4	1
B-17	4	1	FS-27-3	3.99	0
FS-27-3	3.99	0	FS-10-2	3.97	1
FS-10-2	3.97	1	FS-6-3	3.91	1
FS-6-3	3.91	1	FS-11-3	3.89	1
FS-11-3	3.89	1	FS-23-1	3.87	1
FS-23-1	3.87	1	FS-15-1	3.83	1
FS-15-1	3.83	1	FS-5-3	3.77	1
FS-5-3	3.77	1	FS-17-3	3.72	1
FS-17-3	3.72	1	FS-12-2	3.71	1
FS-12-2	3.71	1	FS-31-2	3.7	1
FS-31-2	3.7	1	RB-8b	3.7	1
RB-8b	3.7	1	FS-7-3	3.69	1
FS-7-3	3.69	1	FS-14-1	3.67	1
FS-14-1	3.67	1	FS-15-2	3.67	1
FS-15-2	3.67	1	FS-15-3	3.66	1
FS-15-3	3.66	1	FS-11-2	3.63	1
FS-11-2	3.63	1	FS-25-2	3.55	1
FS-25-2	3.55	1	FS-17-2	3.47	1
FS-17-2	3.47	1	FS-9-2	3.38	1
FS-9-2	3.38	1	FS-7-1	3.24	1
FS-7-1	3.24	1	FS-13-1	3.22	1
FS-13-1	3.22	1	FS-10-1	3.21	1
FS-10-1	3.21	1	FS-9-3	3.16	1
FS-9-3	3.16	1	FS-33-2	3	1
FS-33-2	3	1	B-15	3	1
B-15	3	1	B-18	3	1
B-18	3	1	Boring 2/S1	3	1
Boring 2/S1	3	1	FS-1-2	2.97	1
FS-1-2	2.97	1	FS-18-2	2.8	1
FS-18-2	2.8	1	FS-5-2	2.62	1
FS-5-2	2.62	1	FS-16-2	2.61	1
FS-16-2	2.61	1	FS-2-3	2.56	1
FS-2-3	2.56	1	FS-18-1	2.3	1
FS-18-1	2.3	1	FS-12-1	2.21	1
FS-12-1	2.21	1	FS-24-2	2.15	1
FS-24-2	2.15	1	Boring 3	2	1



Boring 3

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Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
RA2a	25	1
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1
FS-35-2	4.72	1
FS-32-2	4.68	1
FS-4-1	4.59	1
FS-13-2	4.59	1
FS-20-2	4.58	0
FS-34-3	4.53	0
FS-29-3	4.51	0

Remove Highest Concentration, One at a Time		
Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
RB-8a	24.6	1
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1
FS-35-2	4.72	1
FS-32-2	4.68	1
FS-4-1	4.59	1
FS-13-2	4.59	1
FS-20-2	4.58	0
FS-34-3	4.53	0
FS-29-3	4.51	0
FS-3-2	4.49	1

FS-3-2	4.49	1	FS-19-1	4.49	0
FS-19-1	4.49	0	FS-19-2	4.46	0
FS-19-2	4.46	0	FS-1-1	4.42	1
FS-1-1	4.42	1	FS-16-3	4.42	1
FS-16-3	4.42	1	FS-8-2	4.35	1
FS-8-2	4.35	1	FS-35-1	4.31	0
FS-35-1	4.31	0	FS-2-1	4.29	1
FS-2-1	4.29	1	FS-21-1	4.21	0
FS-21-1	4.21	0	FS-22-3	4.21	0
FS-22-3	4.21	0	FS-35-3	4.21	0
FS-35-3	4.21	0	FS-32-3	4.2	0
FS-32-3	4.2	0	FS-33-3	4.18	0
FS-33-3	4.18	0	FS-14-3	4.16	1
FS-14-3	4.16	1	FS-4-2	4.15	1
FS-4-2	4.15	1	FS-17-1	4.13	1
FS-17-1	4.13	1	FS-30-3	4.12	0
FS-30-3	4.12	0	FS-1-3	4.11	1
FS-1-3	4.11	1	FS-30-2	4.11	0
FS-30-2	4.11	0	FS-5-1	4.1	1
FS-5-1	4.1	1	FS-22-2	4.04	0
FS-22-2	4.04	0	FS-13-3	4.02	1
FS-13-3	4.02	1	FS-10-3	4	1
FS-10-3	4	1	B-16	4	1
B-16	4	1	B-17	4	1
B-17	4	1	FS-27-3	3.99	0
FS-27-3	3.99	0	FS-10-2	3.97	1
FS-10-2	3.97	1	FS-6-3	3.91	1
FS-6-3	3.91	1	FS-11-3	3.89	1
FS-11-3	3.89	1	FS-23-1	3.87	1
FS-23-1	3.87	1	FS-15-1	3.83	1
FS-15-1	3.83	1	FS-5-3	3.77	1
FS-5-3	3.77	1	FS-17-3	3.72	1
FS-17-3	3.72	1	FS-12-2	3.71	1
FS-12-2	3.71	1	FS-31-2	3.7	1
FS-31-2	3.7	1	RB-8b	3.7	1
RB-8b	3.7	1	FS-7-3	3.69	1
FS-7-3	3.69	1	FS-14-1	3.67	1
FS-14-1	3.67	1	FS-15-2	3.67	1
FS-15-2	3.67	1	FS-15-3	3.66	1
FS-15-3	3.66	1	FS-11-2	3.63	1
FS-11-2	3.63	1	FS-25-2	3.55	1
FS-25-2	3.55	1	FS-17-2	3.47	1
FS-17-2	3.47	1	FS-9-2	3.38	1
FS-9-2	3.38	1	FS-7-1	3.24	1
FS-7-1	3.24	1	FS-13-1	3.22	1
FS-13-1	3.22	1	FS-10-1	3.21	1
FS-10-1	3.21	1	FS-9-3	3.16	1
FS-9-3	3.16	1	FS-33-2	3	1
FS-33-2	3	1	B-15	3	1
B-15	3	1	B-18	3	1
B-18	3	1	Boring 2/S1	3	1
Boring 2/S1	3	1	FS-1-2	2.97	1
FS-1-2	2.97	1	FS-18-2	2.8	1
FS-18-2	2.8	1	FS-5-2	2.62	1
FS-5-2	2.62	1	FS-16-2	2.61	1
FS-16-2	2.61	1	FS-2-3	2.56	1
FS-2-3	2.56	1	FS-18-1	2.3	1
FS-18-1	2.3	1	FS-12-1	2.21	1
FS-12-1	2.21	1	FS-24-2	2.15	1
FS-24-2	2.15	1	Boring 3	2	1
Boring 3	2	1			

Remove Highest Concentration, One at a Time

Sample Name	Before, Arsenic, 0-3 Ft, mg/kg	d_Before, Arsenic, 0-3 Ft, mg/kg
RB-10b	24.1	1
FS-9-1	23.8	1
S-51	21	1
S-53	20	1
FS-33-1	19.6	1
B-27	18.4	1
FS-29-1	15.8	1
FS-27-1	14	1
FS-16-1	13.9	1
S-52	12	1
FS-34-1	11.6	1
FS-2-2	11.1	1
FS-31-1	8.43	1
FS-31-3	7.73	1
RB-9a	7	1
FS-28-1	6.72	1
RB-9b	6.7	1
FS-3-1	6.42	1
FS-22-1	6.27	1
FS-18-3	6.26	0
FS-34-2	6.21	1
FS-11-1	6.17	1
FS-6-1	5.77	1
FS-25-3	5.77	1
FS-6-2	5.66	1
FS-26-3	5.62	0
FS-23-2	5.59	0
FS-23-3	5.48	0
RB-10a	5.3	1
FS-4-3	5.28	1
FS-19-3	5.27	0
FS-29-2	5.27	1
FS-20-1	5.25	1
FS-28-3	5.2	0
FS-24-3	5.19	1
FS-21-3	5.16	0
FS-12-3	5.04	1
FS-21-2	5.03	0
FS-3-3	5.01	1
FS-20-3	5.01	0
FS-7-2	4.96	1
FS-27-2	4.93	1
FS-26-2	4.92	0
FS-14-2	4.87	1
FS-28-2	4.87	1
FS-8-3	4.8	1
FS-35-2	4.72	1
FS-32-2	4.68	1
FS-4-1	4.59	1
FS-13-2	4.59	1
FS-20-2	4.58	0
FS-34-3	4.53	0
FS-29-3	4.51	0
FS-3-2	4.49	1
FS-19-1	4.49	0

FS-19-2	4.46	0
FS-1-1	4.42	1
FS-16-3	4.42	1
FS-8-2	4.35	1
FS-35-1	4.31	0
FS-2-1	4.29	1
FS-21-1	4.21	0
FS-22-3	4.21	0
FS-35-3	4.21	0
FS-32-3	4.2	0
FS-33-3	4.18	0
FS-14-3	4.16	1
FS-4-2	4.15	1
FS-17-1	4.13	1
FS-30-3	4.12	0
FS-1-3	4.11	1
FS-30-2	4.11	0
FS-5-1	4.1	1
FS-22-2	4.04	0
FS-13-3	4.02	1
FS-10-3	4	1
B-16	4	1
B-17	4	1
FS-27-3	3.99	0
FS-10-2	3.97	1
FS-6-3	3.91	1
FS-11-3	3.89	1
FS-23-1	3.87	1
FS-15-1	3.83	1
FS-5-3	3.77	1
FS-17-3	3.72	1
FS-12-2	3.71	1
FS-31-2	3.7	1
RB-8b	3.7	1
FS-7-3	3.69	1
FS-14-1	3.67	1
FS-15-2	3.67	1
FS-15-3	3.66	1
FS-11-2	3.63	1
FS-25-2	3.55	1
FS-17-2	3.47	1
FS-9-2	3.38	1
FS-7-1	3.24	1
FS-13-1	3.22	1
FS-10-1	3.21	1
FS-9-3	3.16	1
FS-33-2	3	1
B-15	3	1
B-18	3	1
Boring 2/S1	3	1
FS-1-2	2.97	1
FS-18-2	2.8	1
FS-5-2	2.62	1
FS-16-2	2.61	1
FS-2-3	2.56	1
FS-18-1	2.3	1
FS-12-1	2.21	1
FS-24-2	2.15	1
Boring 3	2	1

# General UCL Statistics for Data Sets with Non-Detects

## User Selected Options

From File	Table 1 (2).wst
Full Precision	OFF
Confidence Coefficient	90%
Number of Bootstrap Operations	2000

629, Arsenic, 0-3 Ft, mg/kg

## General Statistics

Number of Valid Data	131	Number of Detected Data	106
Number of Distinct Detected Data	95	Number of Non-Detect Data	25
		Percent Non-Detects	19.08%

## Raw Statistics

Minimum Detected	2	Log-transformed Statistics	
Maximum Detected	629	Minimum Detected	0.693
Mean of Detected	23.34	Maximum Detected	6.444
SD of Detected	76.38	Mean of Detected	2.013
Minimum Non-Detect	3.99	SD of Detected	1.14
Maximum Non-Detect	6.26	Minimum Non-Detect	1.384
		Maximum Non-Detect	1.834

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	36
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	72.52%

## UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.39	Lilliefors Test Statistic	0.236
5% Lilliefors Critical Value	0.0861	5% Lilliefors Critical Value	0.0861
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

## Assuming Normal Distribution

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	19.34	Mean	1.791
SD	69.14	SD	1.124
90% DL/2 (t) UCL	27.12	90% H-Stat (DL/2) UCL	13.42

Maximum Likelihood Estimate(MLE) Method  
MLE yields a negative mean

N/A	Log ROS Method	
	Mean in Log Scale	1.868
	SD in Log Scale	1.07
	Mean in Original Scale	19.57
	SD in Original Scale	69.09
	90% t UCL	27.34
	90% Percentile Bootstrap UCL	27.53
	90% BCA Bootstrap UCL	31.02
	90% H-UCL	13.5

## Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.541	Data Distribution Test with Detected Values Only	
Theta Star	43.14	Data do not follow a Discernable Distribution (0.05)	
nu star	114.7		

## A-D Test Statistic

5% A-D Critical Value	14.83	Nonparametric Statistics	
K-S Test Statistic	0.814	Kaplan-Meier (KM) Method	
5% K-S Critical Value	0.814	Mean	19.56
	0.0926	SD	68.83

Data not Gamma Distributed at 5% Significance Level	SE of Mean	6.042
	90% KM (t) UCL	27.35
Assuming Gamma Distribution	90% KM (z) UCL	27.31
Gamma ROS Statistics using Extrapolated Data	90% KM (jackknife) UCL	27.34
Minimum	1.00E-06 90% KM (bootstrap t) UCL	39.45
Maximum	629 90% KM (BCA) UCL	26.49
Mean	18.89 90% KM (Percentile Bootstrap) UCL	26.87
Median	4.11 90% KM (Chebyshev) UCL	37.69
SD	69.26 95% KM (Chebyshev) UCL	45.9
k star	0.189 97.5% KM (Chebyshev) UCL	57.3
Theta star	99.92 99% KM (Chebyshev) UCL	79.68
Nu star	49.52	
AppChi2	37.27 Potential UCL to Use	
90% Gamma Approximate UCL	25.1 Recommendation Provided only	
90% Adjusted Gamma UCL	25.16 for 95% Confidence Coefficient	

Note: DL/2 is not a recommended method.

449, Arsenic, 0-3 Ft, mg/kg

General Statistics		
Number of Valid Data	130 Number of Detected Data	105
Number of Distinct Detected Data	94 Number of Non-Detect Data	25
	Percent Non-Detects	19.23%

Raw Statistics	Log-transformed Statistics	
Minimum Detected	2 Minimum Detected	0.693
Maximum Detected	449 Maximum Detected	6.107
Mean of Detected	17.58 Mean of Detected	1.971
SD of Detected	48.27 SD of Detected	1.059
Minimum Non-Detect	3.99 Minimum Non-Detect	1.384
Maximum Non-Detect	6.26 Maximum Non-Detect	1.834

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	35
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	73.08%

UCL Statistics		
Normal Distribution Test with Detected Values Only	Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.373 Lilliefors Test Statistic	0.232
5% Lilliefors Critical Value	0.0865 5% Lilliefors Critical Value	0.0865
Data not Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution	Assuming Lognormal Distribution	
DL/2 Substitution Method	DL/2 Substitution Method	
Mean	14.65 Mean	1.755
SD	43.75 SD	1.051
90% DL/2 (t) UCL	19.59 90% H-Stat (DL/2) UCL	11.77

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.835
		SD in Log Scale	0.994
		Mean in Original Scale	14.88
		SD in Original Scale	43.69
		90% t UCL	19.82
		90% Percentile Bootstrap UCL	20.2
		90% BCA Bootstrap UCL	22.76
		90% H-UCL	11.88

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.665	Data do not follow a Discernable Distribution (0.05)	
Theta Star	26.44		
nu star	139.6		
A-D Test Statistic	12.87	Nonparametric Statistics	
5% A-D Critical Value	0.802	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.802	Mean	14.88
5% K-S Critical Value	0.0921	SD	43.52
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3.836
		90% KM (t) UCL	19.82
Assuming Gamma Distribution		90% KM (z) UCL	19.79
Gamma ROS Statistics using Extrapolated Data		90% KM (jackknife) UCL	19.81
Minimum	1.00E-06	90% KM (bootstrap t) UCL	25.22
Maximum	449	90% KM (BCA) UCL	19.9
Mean	14.22	90% KM (Percentile Bootstrap) UCL	19.92
Median	4.105	90% KM (Chebyshev) UCL	26.38
SD	43.88	95% KM (Chebyshev) UCL	31.6
k star	0.209	97.5% KM (Chebyshev) UCL	38.83
Theta star	68.01	99% KM (Chebyshev) UCL	53.04
Nu star	54.36		
AppChi2	41.5	Potential UCL to Use	
90% Gamma Approximate UCL	18.63	Recommendation Provided only	
90% Adjusted Gamma UCL	18.67	for 95% Confidence Coefficient	
Note: DL/2 is not a recommended method.			

136, Arsenic, 0-3 Ft, mg/kg

General Statistics			
Number of Valid Data	129	Number of Detected Data	104
Number of Distinct Detected Data	93	Number of Non-Detect Data	25
		Percent Non-Detects	19.38%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	136	Maximum Detected	4.913
Mean of Detected	13.43	Mean of Detected	1.931
SD of Detected	22.97	SD of Detected	0.982
Minimum Non-Detect	3.99	Minimum Non-Detect	1.384
Maximum Non-Detect	6.26	Maximum Non-Detect	1.834
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	34
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	73.64%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.331	Lilliefors Test Statistic	0.231
5% Lilliefors Critical Value	0.0869	5% Lilliefors Critical Value	0.0869
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	11.28	Mean	1.721
SD	21.07	SD	0.982
90% DL/2 (t) UCL	13.67	90% H-Stat (DL/2) UCL	10.46



Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.804
		SD in Log Scale	0.921
		Mean in Original Scale	11.53
		SD in Original Scale	20.97
		90% t UCL	13.9
		90% Percentile Bootstrap UCL	14
		90% BCA Bootstrap UCL	14.67
		90% H-UCL	10.6

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.861	Data do not follow a Discernable Distribution (0.05)	
Theta Star	15.59		
nu star	179.1		

A-D Test Statistic	11.38	Nonparametric Statistics	
5% A-D Critical Value	0.789	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.789	Mean	11.51
5% K-S Critical Value	0.0915	SD	20.9
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.849
		90% KM (t) UCL	13.89
Assuming Gamma Distribution		90% KM (z) UCL	13.88
Gamma ROS Statistics using Extrapolated Data		90% KM (jackknife) UCL	13.89
Minimum	1.00E-06	90% KM (bootstrap t) UCL	14.75
Maximum	136	90% KM (BCA) UCL	14.01
Mean	11.07	90% KM (Percentile Bootstrap) UCL	14.05
Median	4.11	90% KM (Chebyshev) UCL	17.06
SD	21.17	95% KM (Chebyshev) UCL	19.57
k star	0.338	97.5% KM (Chebyshev) UCL	23.06
Theta star	32.73	99% KM (Chebyshev) UCL	29.91
Nu star	87.3		
AppChi2	70.85	Potential UCL to Use	
90% Gamma Approximate UCL	13.65	Recommendation Provided only	
90% Adjusted Gamma UCL	13.67	for 95% Confidence Coefficient	

Note: DL/2 is not a recommended method.

122, Arsenic, 0-3 Ft, mg/kg

General Statistics			
Number of Valid Data	128	Number of Detected Data	103
Number of Distinct Detected Data	92	Number of Non-Detect Data	25
		Percent Non-Detects	19.53%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	122	Maximum Detected	4.804
Mean of Detected	12.24	Mean of Detected	1.902
SD of Detected	19.6	SD of Detected	0.941
Minimum Non-Detect	3.99	Minimum Non-Detect	1.384
Maximum Non-Detect	6.26	Maximum Non-Detect	1.834

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	33
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	74.22%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.333	Lilliefors Test Statistic	0.229
5% Lilliefors Critical Value	0.0873	5% Lilliefors Critical Value	0.0873
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	10.31	Mean	1.696
SD	18	SD	0.944
90% DL/2 (t) UCL	12.36	90% H-Stat (DL/2) UCL	9.766
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.78
		SD in Log Scale	0.882
		Mean in Original Scale	10.55
		SD in Original Scale	17.9
		90% t UCL	12.59
		90% Percentile Bootstrap UCL	12.76
		90% BCA Bootstrap UCL	12.97
		90% H-UCL	9.919
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.941	Data do not follow a Discernable Distribution (0.05)	
Theta Star	13		
nu star	193.9		
A-D Test Statistic	10.93	Nonparametric Statistics	
5% A-D Critical Value	0.785	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.785	Mean	10.54
5% K-S Critical Value	0.0915	SD	17.84
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.585
		90% KM (t) UCL	12.58
		90% KM (z) UCL	12.57
		90% KM (jackknife) UCL	12.58
Assuming Gamma Distribution		90% KM (bootstrap t) UCL	13.09
Gamma ROS Statistics using Extrapolated Data	1.00E-06	90% KM (BCA) UCL	12.37
Minimum	122	90% KM (Percentile Bootstrap) UCL	12.67
Maximum	10.21	90% KM (Chebyshev) UCL	15.29
Mean	4.12	95% KM (Chebyshev) UCL	17.45
Median	18.06	97.5% KM (Chebyshev) UCL	20.43
SD	0.498	99% KM (Chebyshev) UCL	26.3
k star	20.51		
Theta star	127.4		
Nu star	107.5	Potential UCL to Use	
AppChi2	12.11	Recommendation Provided only	
90% Gamma Approximate UCL	12.13	for 95% Confidence Coefficient	
90% Adjusted Gamma UCL			
Note: DL/2 is not a recommended method.			
96, Arsenic, 0-3 Ft, mg/kg			
General Statistics			
Number of Valid Data	127	Number of Detected Data	102
Number of Distinct Detected Data	91	Number of Non-Detect Data	25
		Percent Non-Detects	19.69%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	96	Maximum Detected	4.564

Mean of Detected	11.16	Mean of Detected	1.874
SD of Detected	16.36	SD of Detected	0.9
Minimum Non-Detect	3.99	Minimum Non-Detect	1.384
Maximum Non-Detect	6.26	Maximum Non-Detect	1.834

## UCL Statistics

### Assuming Normal Distribution

Maximum Likelihood Estimate(MLE) Method  
MLE yields a negative mean

### A-D Test Statistic

### Assuming Gamma Distribution

Note: DL/2 is not a recommended method.

92, Arsenic, 0-3 Ft, mg/kg

#### General Statistics

Number of Valid Data	126	Number of Detected Data	101
Number of Distinct Detected Data	90	Number of Non-Detect Data	25
		Percent Non-Detects	19.84%

#### Raw Statistics

Minimum Detected	2	Log-transformed Statistics	0.693
Maximum Detected	92	Minimum Detected	4.522
Mean of Detected	10.32	Maximum Detected	1.847
SD of Detected	14.05	Mean of Detected	0.863
Minimum Non-Detect	3.99	SD of Detected	1.384
Maximum Non-Detect	6.26	Minimum Non-Detect	1.834
		Maximum Non-Detect	

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	31
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	75.40%

#### UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.336	Lilliefors Test Statistic	0.226
5% Lilliefors Critical Value	0.0882	5% Lilliefors Critical Value	0.0882
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

#### Assuming Normal Distribution

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	8.74	Mean	1.649
SD	12.97	SD	0.871
90% DL/2 (t) UCL	10.23	90% H-Stat (DL/2) UCL	8.609

Maximum Likelihood Estimate(MLE) Method  
MLE yields a negative mean

N/A	Log ROS Method	
	Mean in Log Scale	1.735
	SD in Log Scale	0.807
	Mean in Original Scale	8.995
	SD in Original Scale	12.85
	90% t UCL	10.47
	90% Percentile Bootstrap UCL	10.46
	90% BCA Bootstrap UCL	10.65
	90% H-UCL	8.786

#### Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.137	Data Distribution Test with Detected Values Only	
Theta Star	9.077	Data do not follow a Discernable Distribution (0.05)	
nu star	229.7		

#### A-D Test Statistic

5% A-D Critical Value	10.2	Nonparametric Statistics	
K-S Test Statistic	0.779	Kaplan-Meier (KM) Method	
5% K-S Critical Value	0.779	Mean	8.975
Data not Gamma Distributed at 5% Significance Level	0.0915	SD	12.81
		SE of Mean	1.148
		90% KM (t) UCL	10.45
		90% KM (z) UCL	10.45
		90% KM (jackknife) UCL	10.45
		90% KM (bootstrap t) UCL	10.72
		90% KM (BCA) UCL	10.4
		90% KM (Percentile Bootstrap) UCL	10.53
		90% KM (Chebyshev) UCL	12.42

#### Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data			
Minimum	1.00E-06	90% KM (bootstrap t) UCL	10.72
Maximum	92	90% KM (BCA) UCL	10.4
Mean	8.872	90% KM (Percentile Bootstrap) UCL	10.53
Median	4.312	90% KM (Chebyshev) UCL	12.42

SD	12.93	95% KM (Chebyshev) UCL	13.98
k star	0.913	97.5% KM (Chebyshev) UCL	16.14
Theta star	9.72	99% KM (Chebyshev) UCL	20.39
Nu star	230		
AppChi2	203	Potential UCL to Use	
90% Gamma Approximate UCL	10.05	Recommendation Provided only	
90% Adjusted Gamma UCL	10.06	for 95% Confidence Coefficient	

Note: DL/2 is not a recommended method.

58, Arsenic, 0-3 Ft, mg/kg

#### General Statistics

Number of Valid Data	125	Number of Detected Data	100
Number of Distinct Detected Data	89	Number of Non-Detect Data	25
		Percent Non-Detects	20.00%

#### Raw Statistics

Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	58.2	Maximum Detected	4.064
Mean of Detected	9.504	Mean of Detected	1.82
SD of Detected	11.47	SD of Detected	0.825
Minimum Non-Detect	3.99	Minimum Non-Detect	1.384
Maximum Non-Detect	6.26	Maximum Non-Detect	1.834

#### Log-transformed Statistics

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	30
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	76.00%

#### UCL Statistics

Normal Distribution Test with Detected Values Only	Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.336 Lilliefors Test Statistic	0.223
5% Lilliefors Critical Value	0.0886 5% Lilliefors Critical Value	0.0886
Data not Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	

#### Assuming Normal Distribution

DL/2 Substitution Method	Assuming Lognormal Distribution	
Mean	DL/2 Substitution Method	
SD	8.074 Mean	1.626
90% DL/2 (t) UCL	10.64 SD	0.836
	9.3 90% H-Stat (DL/2) UCL	8.11

Maximum Likelihood Estimate(MLE) Method  
MLE yields a negative mean

N/A	Log ROS Method	
	Mean in Log Scale	1.713
	SD in Log Scale	0.77
	Mean in Original Scale	8.333
	SD in Original Scale	10.51
	90% t UCL	9.544
	90% Percentile Bootstrap UCL	9.584
	90% BCA Bootstrap UCL	9.795
	90% H-UCL	8.297

#### Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.268	Data Distribution Test with Detected Values Only	
Theta Star	7.494	Data do not follow a Discernable Distribution (0.05)	
nu star	253.6		

#### A-D Test Statistic

5% A-D Critical Value	9.943	Nonparametric Statistics	
	0.775	Kaplan-Meier (KM) Method	

K-S Test Statistic	0.775	Mean	8.311
5% K-S Critical Value	0.0915	SD	10.48
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.943
		90% KM (t) UCL	9.526
Assuming Gamma Distribution		90% KM (z) UCL	9.52
Gamma ROS Statistics using Extrapolated Data		90% KM (jackknife) UCL	9.525
Minimum	1.00E-06	90% KM (bootstrap t) UCL	9.703
Maximum	58.2	90% KM (BCA) UCL	9.493
Mean	8.301	90% KM (Percentile Bootstrap) UCL	9.52
Median	4.42	90% KM (Chebyshev) UCL	11.14
SD	10.55	95% KM (Chebyshev) UCL	12.42
k star	1.045	97.5% KM (Chebyshev) UCL	14.2
Theta star	7.947	99% KM (Chebyshev) UCL	17.69
Nu star	261.1		
AppChi2	232.3	Potential UCL to Use	
90% Gamma Approximate UCL	9.331	Recommendation Provided only	
90% Adjusted Gamma UCL	9.342	for 95% Confidence Coefficient	

Note: DL/2 is not a recommended method.

50, Arsenic, 0-3 Ft, mg/kg

General Statistics			
Number of Valid Data	124	Number of Detected Data	99
Number of Distinct Detected Data	88	Number of Non-Detect Data	25
		Percent Non-Detects	20.16%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	50	Maximum Detected	3.912
Mean of Detected	9.012	Mean of Detected	1.798
SD of Detected	10.41	SD of Detected	0.797
Minimum Non-Detect	3.99	Minimum Non-Detect	1.384
Maximum Non-Detect	6.26	Maximum Non-Detect	1.834

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	29
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	76.61%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.335	Lilliefors Test Statistic	0.221
5% Lilliefors Critical Value	0.089	5% Lilliefors Critical Value	0.089
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.67	Mean	1.606
SD	9.672	SD	0.809
90% DL/2 (t) UCL	8.789	90% H-Stat (DL/2) UCL	7.749

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.694
		SD in Log Scale	0.743
		Mean in Original Scale	7.93
		SD in Original Scale	9.542
		90% t UCL	9.034
		90% Percentile Bootstrap UCL	9.014

	90% BCA Bootstrap UCL	9.187
	90% H-UCL	7.943
Gamma Distribution Test with Detected Values Only	Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.355 Data do not follow a Discernable Distribution (0.05)	
Theta Star	6.651	
nu star	268.3	
A-D Test Statistic	9.743 Nonparametric Statistics	
5% A-D Critical Value	0.773 Kaplan-Meier (KM) Method	
K-S Test Statistic	0.773 Mean	7.909
5% K-S Critical Value	0.0918 SD	9.516
Data not Gamma Distributed at 5% Significance Level	SE of Mean	0.86
	90% KM (t) UCL	9.016
Assuming Gamma Distribution	90% KM (z) UCL	9.01
Gamma ROS Statistics using Extrapolated Data	90% KM (jackknife) UCL	9.015
Minimum	1.00E-06 90% KM (bootstrap t) UCL	9.234
Maximum	50 90% KM (BCA) UCL	9.019
Mean	7.943 90% KM (Percentile Bootstrap) UCL	9.056
Median	4.42 90% KM (Chebyshev) UCL	10.49
SD	9.556 95% KM (Chebyshev) UCL	11.66
k star	1.12 97.5% KM (Chebyshev) UCL	13.28
Theta star	7.094 99% KM (Chebyshev) UCL	16.46
Nu star	277.7	
AppChi2	247.9 Potential UCL to Use	
90% Gamma Approximate UCL	8.896 Recommendation Provided only	
90% Adjusted Gamma UCL	8.906 for 95% Confidence Coefficient	
Note: DL/2 is not a recommended method.		
43, Arsenic, 0-3 Ft, mg/kg		
General Statistics		
Number of Valid Data	123 Number of Detected Data	98
Number of Distinct Detected Data	87 Number of Non-Detect Data	25
	Percent Non-Detects	20.33%
Raw Statistics	Log-transformed Statistics	
Minimum Detected	2 Minimum Detected	0.693
Maximum Detected	43 Maximum Detected	3.761
Mean of Detected	8.594 Mean of Detected	1.776
SD of Detected	9.591 SD of Detected	0.771
Minimum Non-Detect	3.99 Minimum Non-Detect	1.384
Maximum Non-Detect	6.26 Maximum Non-Detect	1.834
Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	28
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	77.24%
UCL Statistics		
Normal Distribution Test with Detected Values Only	Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.333 Lilliefors Test Statistic	0.219
5% Lilliefors Critical Value	0.0895 5% Lilliefors Critical Value	0.0895
Data not Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
DL/2 Substitution Method	DL/2 Substitution Method	
Mean	7.325 Mean	1.588

SD	8.917	SD	0.785
90% DL/2 (t) UCL	8.361	90% H-Stat (DL/2) UCL	7.431
Maximum Likelihood Estimate(MLE) Method MLE yields a negative mean	N/A	Log ROS Method Mean in Log Scale SD in Log Scale Mean in Original Scale SD in Original Scale 90% t UCL 90% Percentile Bootstrap UCL 90% BCA Bootstrap UCL 90% H-UCL	1.676 0.718 7.588 8.785 8.609 8.598 8.751 7.631
Gamma Distribution Test with Detected Values Only k star (bias corrected) Theta Star nu star	1.44 5.969 282.2	Data Distribution Test with Detected Values Only Data do not follow a Discernable Distribution (0.05)	
A-D Test Statistic 5% A-D Critical Value K-S Test Statistic 5% K-S Critical Value Data not Gamma Distributed at 5% Significance Level	9.539 0.771 0.771 0.0921	Nonparametric Statistics Kaplan-Meier (KM) Method Mean SD	7.567 8.762
Assuming Gamma Distribution Gamma ROS Statistics using Extrapolated Data Minimum Maximum Mean Median SD k star Theta star Nu star AppChi2 90% Gamma Approximate UCL 90% Adjusted Gamma UCL	1.00E-06 43 7.634 4.42 8.784 1.187 6.429 292.1 261.6	SE of Mean 90% KM (t) UCL 90% KM (z) UCL 90% KM (jackknife) UCL 90% KM (bootstrap t) UCL 90% KM (BCA) UCL 90% KM (Percentile Bootstrap) UCL 90% KM (Chebyshev) UCL 95% KM (Chebyshev) UCL 97.5% KM (Chebyshev) UCL 99% KM (Chebyshev) UCL Potential UCL to Use Recommendation Provided only for 95% Confidence Coefficient	0.795 8.591 8.585 8.59 8.747 8.508 8.573 9.951 11.03 12.53 15.47
Note: DL/2 is not a recommended method.			
41, Arsenic, 0-3 Ft, mg/kg			
General Statistics			
Number of Valid Data	122	Number of Detected Data	97
Number of Distinct Detected Data	86	Number of Non-Detect Data	25
		Percent Non-Detects	20.49%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	41	Maximum Detected	3.714
Mean of Detected	8.239	Mean of Detected	1.756
SD of Detected	8.971	SD of Detected	0.748
Minimum Non-Detect	3.99	Minimum Non-Detect	1.384
Maximum Non-Detect	6.26	Maximum Non-Detect	1.834
Note: Data have multiple DLs - Use of KM Method is recommended For all methods (except KM, DL/2, and ROS Methods), Observations < Largest ND are treated as NDs		Number treated as Non-Detect Number treated as Detected Single DL Non-Detect Percentage	95 27 77.87%



UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.33	Lilliefors Test Statistic	0.217
5% Lilliefors Critical Value	0.09	5% Lilliefors Critical Value	0.09
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.033	Mean	1.57
SD	8.34	SD	0.763
90% DL/2 (t) UCL	8.006	90% H-Stat (DL/2) UCL	7.15
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.659
		SD in Log Scale	0.696
		Mean in Original Scale	7.297
		SD in Original Scale	8.208
		90% t UCL	8.254
		90% Percentile Bootstrap UCL	8.268
		90% BCA Bootstrap UCL	8.45
		90% H-UCL	7.356
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.52	Data do not follow a Discernable Distribution (0.05)	
Theta Star	5.421		
nu star	294.8		
A-D Test Statistic	9.32	Nonparametric Statistics	
5% A-D Critical Value	0.77	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.77	Mean	
5% K-S Critical Value	0.0925	SD	
Data not Gamma Distributed at 5% Significance Level		SE of Mean	
		90% KM (t) UCL	
		90% KM (z) UCL	
		90% KM (jackknife) UCL	
	1.00E-06	90% KM (bootstrap t) UCL	
	41	90% KM (BCA) UCL	
	7.368	90% KM (Percentile Bootstrap) UCL	
	4.42	90% KM (Chebyshev) UCL	
	8.197	95% KM (Chebyshev) UCL	
	1.248	97.5% KM (Chebyshev) UCL	
	5.906	99% KM (Chebyshev) UCL	
	304.4		
AppChi2	273.3	Potential UCL to Use	
90% Gamma Approximate UCL	8.209	Recommendation Provided only	
90% Adjusted Gamma UCL	8.217	for 95% Confidence Coefficient	
Note: DL/2 is not a recommended method.			

40, Arsenic, 0-3 Ft, mg/kg

General Statistics		
Number of Valid Data	121	Number of Detected Data 96
Number of Distinct Detected Data	85	Number of Non-Detect Data 25
		Percent Non-Detects 20.66%
Raw Statistics		
	Log-transformed Statistics	

Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	40	Maximum Detected	3.689
Mean of Detected	7.898	Mean of Detected	1.735
SD of Detected	8.362	SD of Detected	0.724
Minimum Non-Detect	3.99	Minimum Non-Detect	1.384
Maximum Non-Detect	6.26	Maximum Non-Detect	1.834
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	26
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	78.51%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.327	Lilliefors Test Statistic	0.214
5% Lilliefors Critical Value	0.0904	5% Lilliefors Critical Value	0.0904
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.752	Mean	1.552
SD	7.775	SD	0.741
90% DL/2 (t) UCL	7.663	90% H-Stat (DL/2) UCL	6.882
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.642
		SD in Log Scale	0.673
		Mean in Original Scale	7.017
		SD in Original Scale	7.641
		90% t UCL	7.913
		90% Percentile Bootstrap UCL	7.927
		90% BCA Bootstrap UCL	8.087
		90% H-UCL	7.093
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.611	Data do not follow a Discernable Distribution (0.05)	
Theta Star	4.902		
nu star	309.4		
A-D Test Statistic	9.076	Nonparametric Statistics	
5% A-D Critical Value	0.769	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.769	Mean	6.998
5% K-S Critical Value	0.0929	SD	7.623
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.697
		90% KM (t) UCL	7.896
Assuming Gamma Distribution		90% KM (z) UCL	7.891
Gamma ROS Statistics using Extrapolated Data		90% KM (jackknife) UCL	7.895
Minimum	0.226	90% KM (bootstrap t) UCL	8.093
Maximum	40	90% KM (BCA) UCL	7.875
Mean	7.113	90% KM (Percentile Bootstrap) UCL	7.904
Median	4.42	90% KM (Chebyshev) UCL	9.09
SD	7.62	95% KM (Chebyshev) UCL	10.04
k star	1.693	97.5% KM (Chebyshev) UCL	11.35
Theta star	4.201	99% KM (Chebyshev) UCL	13.94
Nu star	409.8		
AppChi2	373.5	Potential UCL to Use	
90% Gamma Approximate UCL	7.803	Recommendation Provided only	
90% Adjusted Gamma UCL	7.81	for 95% Confidence Coefficient	
Note: DL/2 is not a recommended method.			

39, Arsenic, 0-3 Ft, mg/kg

General Statistics

Number of Valid Data	120	Number of Detected Data	95
Number of Distinct Detected Data	84	Number of Non-Detect Data	25
		Percent Non-Detects	20.83%

Raw Statistics

Minimum Detected	2	Log-transformed Statistics	0.693
Maximum Detected	39.3	Minimum Detected	3.671
Mean of Detected	7.56	Maximum Detected	1.715
SD of Detected	7.719	Mean of Detected	0.7
Minimum Non-Detect	3.99	SD of Detected	1.384
Maximum Non-Detect	6.26	Minimum Non-Detect	1.834
		Maximum Non-Detect	

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	25
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	79.17%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.322	Lilliefors Test Statistic	0.211
5% Lilliefors Critical Value	0.0909	5% Lilliefors Critical Value	0.0909
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.475	Mean	1.534
SD	7.183	SD	0.717
90% DL/2 (t) UCL	7.32	90% H-Stat (DL/2) UCL	6.629

Maximum Likelihood Estimate(MLE) Method  
MLE yields a negative mean

N/A	Log ROS Method	
	Mean in Log Scale	1.625
	SD in Log Scale	0.648
	Mean in Original Scale	6.742
	SD in Original Scale	7.047
	90% t UCL	7.571
	90% Percentile Bootstrap UCL	7.624
	90% BCA Bootstrap UCL	7.717
	90% H-UCL	6.843

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	1.722	Data Distribution Test with Detected Values Only	
Theta Star	4.39	Data do not follow a Discernable Distribution (0.05)	
nu star	327.2		

A-D Test Statistic

5% A-D Critical Value	8.807	Nonparametric Statistics	
K-S Test Statistic	0.768	Kaplan-Meier (KM) Method	
5% K-S Critical Value	0.768	Mean	6.723
Data not Gamma Distributed at 5% Significance Level	0.0933	SD	7.031
		SE of Mean	0.646

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	90% KM (t) UCL	7.555
Minimum	90% KM (z) UCL	7.551
Maximum	90% KM (jackknife) UCL	7.554
	90% KM (bootstrap t) UCL	7.724
	90% KM (BCA) UCL	7.636

Mean	6.86	90% KM (Percentile Bootstrap) UCL	7.54
Median	4.385	90% KM (Chebyshev) UCL	8.661
SD	7.017	95% KM (Chebyshev) UCL	9.539
k star	1.87	97.5% KM (Chebyshev) UCL	10.76
Theta star	3.669	99% KM (Chebyshev) UCL	13.15
Nu star	448.7		
AppChi2	410.8	Potential UCL to Use	
90% Gamma Approximate UCL	7.493	Recommendation Provided only	
90% Adjusted Gamma UCL	7.5	for 95% Confidence Coefficient	
Note: DL/2 is not a recommended method.			

37, Arsenic, 0-3 Ft, mg/kg

General Statistics			
Number of Valid Data	119	Number of Detected Data	94
Number of Distinct Detected Data	83	Number of Non-Detect Data	25
		Percent Non-Detects	21.01%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	37	Maximum Detected	3.611
Mean of Detected	7.222	Mean of Detected	1.694
SD of Detected	7.02	SD of Detected	0.673
Minimum Non-Detect	3.99	Minimum Non-Detect	1.384
Maximum Non-Detect	6.26	Maximum Non-Detect	1.834

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	24
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	79.83%

UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.316	Lilliefors Test Statistic	0.207
5% Lilliefors Critical Value	0.0914	5% Lilliefors Critical Value	0.0914
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.199	Mean	1.516
SD	6.544	SD	0.693
90% DL/2 (t) UCL	6.972	90% H-Stat (DL/2) UCL	6.374

Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.608
		SD in Log Scale	0.623
		Mean in Original Scale	6.468
		SD in Original Scale	6.405
		90% t UCL	7.224
		90% Percentile Bootstrap UCL	7.229
		90% BCA Bootstrap UCL	7.332
		90% H-UCL	6.593

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.861	Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.881		
nu star	349.8		

A-D Test Statistic	8.514	Nonparametric Statistics	
5% A-D Critical Value	0.766	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.766	Mean	6.449
5% K-S Critical Value	0.0936	SD	6.392
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.59
		90% KM (t) UCL	7.209
Assuming Gamma Distribution		90% KM (z) UCL	7.205
Gamma ROS Statistics using Extrapolated Data		90% KM (jackknife) UCL	7.208
Minimum	0.9	90% KM (bootstrap t) UCL	7.36
Maximum	37	90% KM (BCA) UCL	7.184
Mean	6.605	90% KM (Percentile Bootstrap) UCL	7.234
Median	4.35	90% KM (Chebyshev) UCL	8.219
SD	6.366	95% KM (Chebyshev) UCL	9.021
k star	2.067	97.5% KM (Chebyshev) UCL	10.13
Theta star	3.195	99% KM (Chebyshev) UCL	12.32
Nu star	492		
AppChi2	452.3	Potential UCL to Use	
90% Gamma Approximate UCL	7.186	Recommendation Provided only	
90% Adjusted Gamma UCL	7.192	for 95% Confidence Coefficient	
Note: DL/2 is not a recommended method.			

29, Arsenic, 0-3 Ft, mg/kg

General Statistics			
Number of Valid Data	118	Number of Detected Data	93
Number of Distinct Detected Data	82	Number of Non-Detect Data	25
		Percent Non-Detects	21.19%
Raw Statistics			
Log-transformed Statistics			
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	29.3	Maximum Detected	3.378
Mean of Detected	6.902	Mean of Detected	1.673
SD of Detected	6.33	SD of Detected	0.646
Minimum Non-Detect	3.99	Minimum Non-Detect	1.384
Maximum Non-Detect	6.26	Maximum Non-Detect	1.834
Note: Data have multiple DLs - Use of KM Method is recommended			
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Non-Detect	95
Observations < Largest ND are treated as NDs		Number treated as Detected	23
		Single DL Non-Detect Percentage	80.51%
UCL Statistics			
Lognormal Distribution Test with Detected Values Only			
Lilliefors Test Statistic	0.307	Lilliefors Test Statistic	0.202
5% Lilliefors Critical Value	0.0919	5% Lilliefors Critical Value	0.0919
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution			
Assuming Lognormal Distribution			
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.938	Mean	1.498
SD	5.917	SD	0.668
90% DL/2 (t) UCL	6.64	90% H-Stat (DL/2) UCL	6.133
Maximum Likelihood Estimate(MLE) Method			
MLE yields a negative mean	N/A	Log ROS Method	
		Mean in Log Scale	1.591
		SD in Log Scale	0.597
		Mean in Original Scale	6.209
		SD in Original Scale	5.774

	90% t UCL	6.894
	90% Percentile Bootstrap UCL	6.874
	90% BCA Bootstrap UCL	6.958
	90% H-UCL	6.356

Gamma Distribution Test with Detected Values Only	Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.025 Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.408	
nu star	376.7	

A-D Test Statistic	8.209 Nonparametric Statistics	
5% A-D Critical Value	0.765 Kaplan-Meier (KM) Method	
K-S Test Statistic	0.765 Mean	6.19
5% K-S Critical Value	0.094 SD	5.765
Data not Gamma Distributed at 5% Significance Level	SE of Mean	0.535
	90% KM (t) UCL	6.879
Assuming Gamma Distribution	90% KM (z) UCL	6.875
Gamma ROS Statistics using Extrapolated Data	90% KM (jackknife) UCL	6.878
Minimum	1.213 90% KM (bootstrap t) UCL	6.957
Maximum	29.3 90% KM (BCA) UCL	6.844
Mean	6.361 90% KM (Percentile Bootstrap) UCL	6.916
Median	4.32 90% KM (Chebyshev) UCL	7.794
SD	5.728 95% KM (Chebyshev) UCL	8.52
k star	2.292 97.5% KM (Chebyshev) UCL	9.529
Theta star	2.776 99% KM (Chebyshev) UCL	11.51
Nu star	540.9	
AppChi2	499.2 Potential UCL to Use	
90% Gamma Approximate UCL	6.893 Recommendation Provided only	
90% Adjusted Gamma UCL	6.898 for 95% Confidence Coefficient	
Note: DL/2 is not a recommended method.		

27, Arsenic, 0-3 Ft, mg/kg

General Statistics		
Number of Valid Data	117 Number of Detected Data	92
Number of Distinct Detected Data	81 Number of Non-Detect Data	25
	Percent Non-Detects	21.37%

Raw Statistics	Log-transformed Statistics	
Minimum Detected	2 Minimum Detected	0.693
Maximum Detected	27 Maximum Detected	3.296
Mean of Detected	6.658 Mean of Detected	1.655
SD of Detected	5.911 SD of Detected	0.624
Minimum Non-Detect	3.99 Minimum Non-Detect	1.384
Maximum Non-Detect	6.26 Maximum Non-Detect	1.834

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	22
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	81.20%

UCL Statistics		
Normal Distribution Test with Detected Values Only	Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.3 Lilliefors Test Statistic	0.198
5% Lilliefors Critical Value	0.0924 5% Lilliefors Critical Value	0.0924
Data not Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution	Assuming Lognormal Distribution
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DL/2 Substitution Method	DL/2 Substitution Method	
Mean	5.739 Mean	1.482
SD	5.529 SD	0.648
90% DL/2 (t) UCL	6.397 90% H-Stat (DL/2) UCL	5.937
Maximum Likelihood Estimate(MLE) Method MLE yields a negative mean	N/A Log ROS Method	
	Mean in Log Scale	1.575
	SD in Log Scale	0.576
	Mean in Original Scale	6.01
	SD in Original Scale	5.385
	90% t UCL	6.652
	90% Percentile Bootstrap UCL	6.682
	90% BCA Bootstrap UCL	6.732
	90% H-UCL	6.162
Gamma Distribution Test with Detected Values Only k star (bias corrected)	2.16 Data Distribution Test with Detected Values Only Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.082	
nu star	397.5	
A-D Test Statistic	7.908 Nonparametric Statistics	
5% A-D Critical Value	0.764 Kaplan-Meier (KM) Method	
K-S Test Statistic	0.764 Mean	5.992
5% K-S Critical Value	0.0944 SD	5.377
Data not Gamma Distributed at 5% Significance Level	SE of Mean	0.501
	90% KM (t) UCL	6.638
Assuming Gamma Distribution	90% KM (z) UCL	6.634
Gamma ROS Statistics using Extrapolated Data	90% KM (jackknife) UCL	6.637
Minimum	1.429 90% KM (bootstrap t) UCL	6.721
Maximum	27 90% KM (BCA) UCL	6.618
Mean	6.172 90% KM (Percentile Bootstrap) UCL	6.674
Median	4.302 90% KM (Chebyshev) UCL	7.495
SD	5.336 95% KM (Chebyshev) UCL	8.176
k star	2.477 97.5% KM (Chebyshev) UCL	9.121
Theta star	2.491 99% KM (Chebyshev) UCL	10.98
Nu star	579.7	
AppChi2	536.5 Potential UCL to Use	
90% Gamma Approximate UCL	6.669 Recommendation Provided only	
90% Adjusted Gamma UCL	6.674 for 95% Confidence Coefficient	
Note: DL/2 is not a recommended method.		
25, Arsenic, 0-3 Ft, mg/kg		
General Statistics		
Number of Valid Data	116 Number of Detected Data	91
Number of Distinct Detected Data	80 Number of Non-Detect Data	25
	Percent Non-Detects	21.55%
Raw Statistics	Log-transformed Statistics	
Minimum Detected	2 Minimum Detected	0.693
Maximum Detected	25 Maximum Detected	3.219
Mean of Detected	6.435 Mean of Detected	1.637
SD of Detected	5.538 SD of Detected	0.603
Minimum Non-Detect	3.99 Minimum Non-Detect	1.384
Maximum Non-Detect	6.26 Maximum Non-Detect	1.834
Note: Data have multiple DLs - Use of KM Method is recommended Number treated as Non-Detect		95

For all methods (except KM, DL/2, and ROS Methods), Observations < Largest ND are treated as NDs		Number treated as Detected Single DL Non-Detect Percentage	21 81.90%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.295	Lilliefors Test Statistic	0.194
5% Lilliefors Critical Value	0.0929	5% Lilliefors Critical Value	0.0929
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.555	Mean	1.467
SD	5.183	SD	0.628
90% DL/2 (t) UCL	6.176	90% H-Stat (DL/2) UCL	5.755
Maximum Likelihood Estimate(MLE) Method MLE yields a negative mean	N/A	Log ROS Method Mean in Log Scale SD in Log Scale Mean in Original Scale SD in Original Scale 90% t UCL 90% Percentile Bootstrap UCL 90% BCA Bootstrap UCL 90% H-UCL	1.56 0.556 5.828 5.039 6.431 6.448 6.503 5.983
Gamma Distribution Test with Detected Values Only k star (bias corrected) Theta Star nu star		Data Distribution Test with Detected Values Only 2.304 Data do not follow a Discernable Distribution (0.05) 2.793 419.3	
A-D Test Statistic	7.576	Nonparametric Statistics	
5% A-D Critical Value	0.763	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.763	Mean	5.811
5% K-S Critical Value	0.0947	SD	5.032
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.471
		90% KM (t) UCL	6.418
Assuming Gamma Distribution		90% KM (z) UCL	6.415
Gamma ROS Statistics using Extrapolated Data		90% KM (jackknife) UCL	6.418
Minimum	1.619	90% KM (bootstrap t) UCL	6.536
Maximum	25	90% KM (BCA) UCL	6.436
Mean	5.996	90% KM (Percentile Bootstrap) UCL	6.423
Median	4.327	90% KM (Chebyshev) UCL	7.224
SD	4.988	95% KM (Chebyshev) UCL	7.865
k star	2.673	97.5% KM (Chebyshev) UCL	8.753
Theta star	2.243	99% KM (Chebyshev) UCL	10.5
Nu star	620.2		
AppChi2	575.5	Potential UCL to Use	
90% Gamma Approximate UCL	6.462	Recommendation Provided only	
90% Adjusted Gamma UCL	6.467	for 95% Confidence Coefficient	
Note: DL/2 is not a recommended method.			
24.6, Arsenic, 0-3 Ft, mg/kg			
General Statistics			
Number of Valid Data	115	Number of Detected Data	90
Number of Distinct Detected Data	79	Number of Non-Detect Data	25
		Percent Non-Detects	21.74%



Raw Statistics		Log-transformed Statistics	
Minimum Detected		2 Minimum Detected	0.693
Maximum Detected		24.6 Maximum Detected	3.203
Mean of Detected		6.229 Mean of Detected	1.619
SD of Detected		5.206 SD of Detected	0.583
Minimum Non-Detect		3.99 Minimum Non-Detect	1.384
Maximum Non-Detect		6.26 Maximum Non-Detect	1.834
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	20
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	82.61%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.293	Lilliefors Test Statistic	0.189
5% Lilliefors Critical Value	0.0934	5% Lilliefors Critical Value	0.0934
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.386	Mean	1.452
SD	4.874	SD	0.609
90% DL/2 (t) UCL	5.972	90% H-Stat (DL/2) UCL	5.585
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.545
		SD in Log Scale	0.536
		Mean in Original Scale	5.66
		SD in Original Scale	4.729
		90% t UCL	6.228
		90% Percentile Bootstrap UCL	6.248
		90% BCA Bootstrap UCL	6.31
		90% H-UCL	5.816
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.457	Data do not follow a Discernable Distribution (0.05)	
Theta Star	2.535		
nu star	442.3		
A-D Test Statistic	7.209	Nonparametric Statistics	
5% A-D Critical Value	0.762	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.762	Mean	5.644
5% K-S Critical Value	0.0951	SD	4.724
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.444
		90% KM (t) UCL	6.217
		90% KM (z) UCL	6.214
Assuming Gamma Distribution		90% KM (jackknife) UCL	6.216
Gamma ROS Statistics using Extrapolated Data		90% KM (bootstrap t) UCL	6.298
Minimum	1.788	90% KM (BCA) UCL	6.225
Maximum	24.6	90% KM (Percentile Bootstrap) UCL	6.221
Mean	5.832	90% KM (Chebyshev) UCL	6.977
Median	4.341	95% KM (Chebyshev) UCL	7.581
SD	4.677	97.5% KM (Chebyshev) UCL	8.419
k star	2.881	99% KM (Chebyshev) UCL	10.07
Theta star	2.024		
Nu star	662.7		
AppChi2	616.5	Potential UCL to Use	
90% Gamma Approximate UCL	6.27	Recommendation Provided only	

90% Adjusted Gamma UCL  
Note: DL/2 is not a recommended method.

6.274 for 95% Confidence Coefficient

24, Arsenic, 0-3 Ft, mg/kg

#### General Statistics

Number of Valid Data	114	Number of Detected Data	89
Number of Distinct Detected Data	78	Number of Non-Detect Data	25
		Percent Non-Detects	21.93%

#### Raw Statistics

Minimum Detected  
Maximum Detected  
Mean of Detected  
SD of Detected  
Minimum Non-Detect  
Maximum Non-Detect

#### Log-transformed Statistics

2	Minimum Detected	0.693
24.1	Maximum Detected	3.182
6.022	Mean of Detected	1.601
4.851	SD of Detected	0.561
3.99	Minimum Non-Detect	1.384
6.26	Maximum Non-Detect	1.834

Note: Data have multiple DLs - Use of KM Method is recommended  
For all methods (except KM, DL/2, and ROS Methods),  
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	95
Number treated as Detected	19
Single DL Non-Detect Percentage	83.33%

#### UCL Statistics

Normal Distribution Test with Detected Values Only  
Lilliefors Test Statistic  
5% Lilliefors Critical Value  
Data not Normal at 5% Significance Level

Lognormal Distribution Test with Detected Values Only		
0.29	Lilliefors Test Statistic	0.183
0.0939	5% Lilliefors Critical Value	0.0939
Data not Lognormal at 5% Significance Level		

#### Assuming Normal Distribution

DL/2 Substitution Method  
Mean  
SD  
90% DL/2 (t) UCL

#### Assuming Lognormal Distribution

DL/2 Substitution Method		
5.218	Mean	1.436
4.547	SD	0.588
5.767	90% H-Stat (DL/2) UCL	5.418

Maximum Likelihood Estimate(MLE) Method  
MLE yields a negative mean

N/A

Log ROS Method	
Mean in Log Scale	1.53
SD in Log Scale	0.515
Mean in Original Scale	5.493
SD in Original Scale	4.4
90% t UCL	6.024
90% Percentile Bootstrap UCL	6.045
90% BCA Bootstrap UCL	6.082
90% H-UCL	5.651

Gamma Distribution Test with Detected Values Only  
k star (bias corrected)  
Theta Star  
nu star

Data Distribution Test with Detected Values Only	
2.646	Data do not follow a Discernable Distribution (0.05)
2.276	
471	

#### A-D Test Statistic

5% A-D Critical Value  
K-S Test Statistic  
5% K-S Critical Value  
Data not Gamma Distributed at 5% Significance Level

6.786	Nonparametric Statistics	
0.761	Kaplan-Meier (KM) Method	
0.761	Mean	5.478
0.0956	SD	4.396
	SE of Mean	0.416
	90% KM (t) UCL	6.014
	90% KM (z) UCL	6.011
	90% KM (jackknife) UCL	6.013

#### Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	1.954	90% KM (bootstrap t) UCL	6.105
Maximum	24.1	90% KM (BCA) UCL	6.002
Mean	5.668	90% KM (Percentile Bootstrap) UCL	6.03
Median	4.347	90% KM (Chebyshev) UCL	6.725
SD	4.348	95% KM (Chebyshev) UCL	7.29
k star	3.134	97.5% KM (Chebyshev) UCL	8.073
Theta star	1.808	99% KM (Chebyshev) UCL	9.613
Nu star	714.7		
AppChi2	666.7	Potential UCL to Use	
90% Gamma Approximate UCL	6.076	Recommendation Provided only	
90% Adjusted Gamma UCL	6.08	for 95% Confidence Coeficient	
Note: DL/2 is not a recommended method.			

629, Arsenic, 0-3 Ft, mg/kg	d_629, Arsenic, 0-3 Ft, mg/kg	449, Arsenic, 0-3 Ft, mg/kg	d_449, Arsenic, 0-3 Ft, mg/kg	136, Arsenic, 0-3 Ft, mg/kg	d_136, Arsenic, 0-3 Ft, mg/kg	122, Arsenic, 0-3 Ft, mg/kg	d_122, Arsenic, 0-3 Ft, mg/kg
629	1	449	1	136	1	122	1
449	1	136	1	122	1	96	1
136	1	122	1	96	1	92	1
122	1	96	1	92	1	58.2	1
96	1	92	1	58.2	1	50	1
92	1	58.2	1	50	1	43	1
58.2	1	50	1	43	1	41	1
50	1	43	1	41	1	40	1
43	1	41	1	40	1	39.3	1
41	1	40	1	39.3	1	37	1
40	1	39.3	1	37	1	29.3	1
39.3	1	37	1	29.3	1	27	1
37	1	29.3	1	27	1	25	1
29.3	1	27	1	25	1	24.6	1
27	1	25	1	24.6	1	24.1	1
25	1	24.6	1	24.1	1	23.8	1
24.6	1	24.1	1	23.8	1	21	1
24.1	1	23.8	1	21	1	20	1
23.8	1	21	1	20	1	19.6	1
21	1	20	1	19.6	1	18.4	1
20	1	19.6	1	18.4	1	15.8	1
19.6	1	18.4	1	15.8	1	14	1
18.4	1	15.8	1	14	1	13.9	1
15.8	1	14	1	13.9	1	12	1
14	1	13.9	1	12	1	11.6	1
13.9	1	12	1	11.6	1	11.1	1
12	1	11.6	1	11.1	1	8.43	1
11.6	1	11.1	1	8.43	1	7.73	1
11.1	1	8.43	1	7.73	1	7	1
8.43	1	7.73	1	7	1	6.72	1
7.73	1	7	1	6.72	1	6.7	1
7	1	6.72	1	6.7	1	6.42	1
6.72	1	6.7	1	6.42	1	6.27	1
6.7	1	6.42	1	6.27	1	6.26	0
6.42	1	6.27	1	6.26	0	6.21	1
6.27	1	6.26	0	6.21	1	6.17	1
6.26	0	6.21	1	6.17	1	5.77	1
6.21	1	6.17	1	5.77	1	5.77	1
6.17	1	5.77	1	5.77	1	5.66	1
5.77	1	5.77	1	5.66	1	5.62	0
5.77	1	5.66	1	5.62	0	5.59	0
5.66	1	5.62	0	5.59	0	5.48	0
5.62	0	5.59	0	5.48	0	5.3	1
5.59	0	5.48	0	5.3	1	5.28	1
5.48	0	5.3	1	5.28	1	5.27	0
5.3	1	5.28	1	5.27	0	5.27	1
5.28	1	5.27	0	5.27	1	5.25	1
5.27	0	5.27	1	5.25	1	5.2	0
5.27	1	5.25	1	5.2	0	5.19	1
5.25	1	5.2	0	5.19	1	5.16	0
5.2	0	5.19	1	5.16	0	5.04	1
5.19	1	5.16	0	5.04	1	5.03	0
5.16	0	5.04	1	5.03	0	5.01	1
5.04	1	5.03	0	5.01	1	5.01	0
5.03	0	5.01	1	5.01	0	4.96	1
5.01	1	5.01	0	4.96	1	4.93	1
5.01	0	4.96	1	4.93	1	4.92	0
4.96	1	4.93	1	4.92	0	4.87	1
4.93	1	4.92	0	4.87	1	4.87	1

4.92	0	4.87	1	4.87	1	4.8	1
4.87	1	4.87	1	4.8	1	4.72	1
4.87	1	4.8	1	4.72	1	4.68	1
4.8	1	4.72	1	4.68	1	4.59	1
4.72	1	4.68	1	4.59	1	4.59	1
4.68	1	4.59	1	4.59	1	4.58	0
4.59	1	4.59	1	4.58	0	4.53	0
4.59	1	4.58	0	4.53	0	4.51	0
4.58	0	4.53	0	4.51	0	4.49	1
4.53	0	4.51	0	4.49	1	4.49	0
4.51	0	4.49	1	4.49	0	4.46	0
4.49	1	4.49	0	4.46	0	4.42	1
4.49	0	4.46	0	4.42	1	4.42	1
4.46	0	4.42	1	4.42	1	4.35	1
4.42	1	4.42	1	4.35	1	4.31	0
4.42	1	4.35	1	4.31	0	4.29	1
4.35	1	4.31	0	4.29	1	4.21	0
4.31	0	4.29	1	4.21	0	4.21	0
4.29	1	4.21	0	4.21	0	4.21	0
4.21	0	4.21	0	4.21	0	4.2	0
4.21	0	4.21	0	4.2	0	4.18	0
4.21	0	4.2	0	4.18	0	4.16	1
4.2	0	4.18	0	4.16	1	4.15	1
4.18	0	4.16	1	4.15	1	4.13	1
4.16	1	4.15	1	4.13	1	4.12	0
4.15	1	4.13	1	4.12	0	4.11	1
4.13	1	4.12	0	4.11	1	4.11	0
4.12	0	4.11	1	4.11	0	4.1	1
4.11	1	4.11	0	4.1	1	4.04	0
4.11	0	4.1	1	4.04	0	4.02	1
4.1	1	4.04	0	4.02	1	4	1
4.04	0	4.02	1	4	1	4	1
4.02	1	4	1	4	1	4	1
4	1	4	1	4	1	3.99	0
4	1	4	1	3.99	0	3.97	1
4	1	3.99	0	3.97	1	3.91	1
3.99	0	3.97	1	3.91	1	3.89	1
3.97	1	3.91	1	3.89	1	3.87	1
3.91	1	3.89	1	3.87	1	3.83	1
3.89	1	3.87	1	3.83	1	3.77	1
3.87	1	3.83	1	3.77	1	3.72	1
3.83	1	3.77	1	3.72	1	3.71	1
3.77	1	3.72	1	3.71	1	3.7	1
3.72	1	3.71	1	3.7	1	3.7	1
3.71	1	3.7	1	3.7	1	3.69	1
3.7	1	3.7	1	3.69	1	3.67	1
3.7	1	3.69	1	3.67	1	3.67	1
3.69	1	3.67	1	3.67	1	3.66	1
3.67	1	3.67	1	3.66	1	3.63	1
3.67	1	3.66	1	3.63	1	3.55	1
3.66	1	3.63	1	3.55	1	3.47	1
3.63	1	3.55	1	3.47	1	3.38	1
3.55	1	3.47	1	3.38	1	3.24	1
3.47	1	3.38	1	3.24	1	3.22	1
3.38	1	3.24	1	3.22	1	3.21	1
3.24	1	3.22	1	3.21	1	3.16	1
3.22	1	3.21	1	3.16	1	3	1
3.21	1	3.16	1	3	1	3	1
3.16	1	3	1	3	1	3	1
3	1	3	1	3	1	3	1
3	1	3	1	3	1	2.97	1
3	1	3	1	2.97	1	2.8	1

3	1	2.97	1	2.8	1	2.62	1
2.97	1	2.8	1	2.62	1	2.61	1
2.8	1	2.62	1	2.61	1	2.56	1
2.62	1	2.61	1	2.56	1	2.3	1
2.61	1	2.56	1	2.3	1	2.21	1
2.56	1	2.3	1	2.21	1	2.15	1
2.3	1	2.21	1	2.15	1	2	1
2.21	1	2.15	1	2	1		
2.15	1	2	1				
2	1						

96, Arsenic, 0-3 Ft,	d_96, Arsenic, 0-3 Ft, mg/kg	92, Arsenic, 0-3 Ft,	d_92, Arsenic, 0-3 Ft, mg/kg	58, Arsenic, 0-3 Ft,	d_58, Arsenic, 0-3 Ft, mg/kg	50, Arsenic, 0-3 Ft,	d_50, Arsenic, 0-3 Ft, mg/kg
96	1	92	1	58.2	1	50	1
92	1	58.2	1	50	1	43	1
58.2	1	50	1	43	1	41	1
50	1	43	1	41	1	40	1
43	1	41	1	40	1	39.3	1
41	1	40	1	39.3	1	37	1
40	1	39.3	1	37	1	29.3	1
39.3	1	37	1	29.3	1	27	1
37	1	29.3	1	27	1	25	1
29.3	1	27	1	25	1	24.6	1
27	1	25	1	24.6	1	24.1	1
25	1	24.6	1	24.1	1	23.8	1
24.6	1	24.1	1	23.8	1	21	1
24.1	1	23.8	1	21	1	20	1
23.8	1	21	1	20	1	19.6	1
21	1	20	1	19.6	1	18.4	1
20	1	19.6	1	18.4	1	15.8	1
19.6	1	18.4	1	15.8	1	14	1
18.4	1	15.8	1	14	1	13.9	1
15.8	1	14	1	13.9	1	12	1
14	1	13.9	1	12	1	11.6	1
13.9	1	12	1	11.6	1	11.1	1
12	1	11.6	1	11.1	1	8.43	1
11.6	1	11.1	1	8.43	1	7.73	1
11.1	1	8.43	1	7.73	1	7	1
8.43	1	7.73	1	7	1	6.72	1
7.73	1	7	1	6.72	1	6.7	1
7	1	6.72	1	6.7	1	6.42	1
6.72	1	6.7	1	6.42	1	6.27	1
6.7	1	6.42	1	6.27	1	6.26	0
6.42	1	6.27	1	6.26	0	6.21	1
6.27	1	6.26	0	6.21	1	6.17	1
6.26	0	6.21	1	6.17	1	5.77	1
6.21	1	6.17	1	5.77	1	5.77	1
6.17	1	5.77	1	5.77	1	5.66	1
5.77	1	5.77	1	5.66	1	5.62	0
5.77	1	5.66	1	5.62	0	5.59	0
5.66	1	5.62	0	5.59	0	5.48	0
5.62	0	5.59	0	5.48	0	5.3	1
5.59	0	5.48	0	5.3	1	5.28	1
5.48	0	5.3	1	5.28	1	5.27	0
5.3	1	5.28	1	5.27	0	5.27	1
5.28	1	5.27	0	5.27	1	5.25	1
5.27	0	5.27	1	5.25	1	5.2	0
5.27	1	5.25	1	5.2	0	5.19	1
5.25	1	5.2	0	5.19	1	5.16	0
5.2	0	5.19	1	5.16	0	5.04	1
5.19	1	5.16	0	5.04	1	5.03	0
5.16	0	5.04	1	5.03	0	5.01	1
5.04	1	5.03	0	5.01	1	5.01	0
5.03	0	5.01	1	5.01	0	4.96	1
5.01	1	5.01	0	4.96	1	4.93	1
5.01	0	4.96	1	4.93	1	4.92	0
4.96	1	4.93	1	4.92	0	4.87	1
4.93	1	4.92	0	4.87	1	4.87	1
4.92	0	4.87	1	4.87	1	4.8	1
4.87	1	4.87	1	4.8	1	4.72	1
4.87	1	4.8	1	4.72	1	4.68	1
4.8	1	4.72	1	4.68	1	4.59	1

4.72	1	4.68	1	4.59	1	4.59	1
4.68	1	4.59	1	4.59	1	4.58	0
4.59	1	4.59	1	4.58	0	4.53	0
4.59	1	4.58	0	4.53	0	4.51	0
4.58	0	4.53	0	4.51	0	4.49	1
4.53	0	4.51	0	4.49	1	4.49	0
4.51	0	4.49	1	4.49	0	4.46	0
4.49	1	4.49	0	4.46	0	4.42	1
4.49	0	4.46	0	4.42	1	4.42	1
4.46	0	4.42	1	4.42	1	4.35	1
4.42	1	4.42	1	4.35	1	4.31	0
4.42	1	4.35	1	4.31	0	4.29	1
4.35	1	4.31	0	4.29	1	4.21	0
4.31	0	4.29	1	4.21	0	4.21	0
4.29	1	4.21	0	4.21	0	4.21	0
4.21	0	4.21	0	4.21	0	4.2	0
4.21	0	4.21	0	4.2	0	4.18	0
4.21	0	4.2	0	4.18	0	4.16	1
4.2	0	4.18	0	4.16	1	4.15	1
4.18	0	4.16	1	4.15	1	4.13	1
4.16	1	4.15	1	4.13	1	4.12	0
4.15	1	4.13	1	4.12	0	4.11	1
4.13	1	4.12	0	4.11	1	4.11	0
4.12	0	4.11	1	4.11	0	4.1	1
4.11	1	4.11	0	4.1	1	4.04	0
4.11	0	4.1	1	4.04	0	4.02	1
4.1	1	4.04	0	4.02	1	4	1
4.04	0	4.02	1	4	1	4	1
4.02	1	4	1	4	1	4	1
4	1	4	1	4	1	3.99	0
4	1	4	1	3.99	0	3.97	1
4	1	3.99	0	3.97	1	3.91	1
3.99	0	3.97	1	3.91	1	3.89	1
3.97	1	3.91	1	3.89	1	3.87	1
3.91	1	3.89	1	3.87	1	3.83	1
3.89	1	3.87	1	3.83	1	3.77	1
3.87	1	3.83	1	3.77	1	3.72	1
3.83	1	3.77	1	3.72	1	3.71	1
3.77	1	3.72	1	3.71	1	3.7	1
3.72	1	3.71	1	3.7	1	3.7	1
3.71	1	3.7	1	3.7	1	3.69	1
3.7	1	3.7	1	3.69	1	3.67	1
3.7	1	3.69	1	3.67	1	3.67	1
3.69	1	3.67	1	3.67	1	3.66	1
3.67	1	3.67	1	3.66	1	3.63	1
3.67	1	3.66	1	3.63	1	3.55	1
3.66	1	3.63	1	3.55	1	3.47	1
3.63	1	3.55	1	3.47	1	3.38	1
3.55	1	3.47	1	3.38	1	3.24	1
3.47	1	3.38	1	3.24	1	3.22	1
3.38	1	3.24	1	3.22	1	3.21	1
3.24	1	3.22	1	3.21	1	3.16	1
3.22	1	3.21	1	3.16	1	3	1
3.21	1	3.16	1	3	1	3	1
3.16	1	3	1	3	1	3	1
3	1	3	1	3	1	3	1
3	1	3	1	3	1	2.97	1
3	1	3	1	2.97	1	2.8	1
3	1	2.97	1	2.8	1	2.62	1
2.97	1	2.8	1	2.62	1	2.61	1
2.8	1	2.62	1	2.61	1	2.56	1
2.62	1	2.61	1	2.56	1	2.3	1



2.61	1	2.56	1	2.3	1	2.21	1
2.56	1	2.3	1	2.21	1	2.15	1
2.3	1	2.21	1	2.15	1	2	1
2.21	1	2.15	1	2	1		
2.15	1	2	1				
2	1						

43, Arsenic, 0-3 Ft, mg/kg	d_43, Arsenic, 0-3 Ft, mg/kg	41, Arsenic, 0-3 Ft, mg/kg	d_41, Arsenic, 0-3 Ft, mg/kg	40, Arsenic, 0-3 Ft, mg/kg	d_40, Arsenic, 0-3 Ft, mg/kg	39, Arsenic, 0-3 Ft, mg/kg	d_39, Arsenic, 0-3 Ft, mg/kg
43	1	41	1	40	1	39.3	1
41	1	40	1	39.3	1	37	1
40	1	39.3	1	37	1	29.3	1
39.3	1	37	1	29.3	1	27	1
37	1	29.3	1	27	1	25	1
29.3	1	27	1	25	1	24.6	1
27	1	25	1	24.6	1	24.1	1
25	1	24.6	1	24.1	1	23.8	1
24.6	1	24.1	1	23.8	1	21	1
24.1	1	23.8	1	21	1	20	1
23.8	1	21	1	20	1	19.6	1
21	1	20	1	19.6	1	18.4	1
20	1	19.6	1	18.4	1	15.8	1
19.6	1	18.4	1	15.8	1	14	1
18.4	1	15.8	1	14	1	13.9	1
15.8	1	14	1	13.9	1	12	1
14	1	13.9	1	12	1	11.6	1
13.9	1	12	1	11.6	1	11.1	1
12	1	11.6	1	11.1	1	8.43	1
11.6	1	11.1	1	8.43	1	7.73	1
11.1	1	8.43	1	7.73	1	7	1
8.43	1	7.73	1	7	1	6.72	1
7.73	1	7	1	6.72	1	6.7	1
7	1	6.72	1	6.7	1	6.42	1
6.72	1	6.7	1	6.42	1	6.27	1
6.7	1	6.42	1	6.27	1	6.26	0
6.42	1	6.27	1	6.26	0	6.21	1
6.27	1	6.26	0	6.21	1	6.17	1
6.26	0	6.21	1	6.17	1	5.77	1
6.21	1	6.17	1	5.77	1	5.77	1
6.17	1	5.77	1	5.77	1	5.66	1
5.77	1	5.77	1	5.66	1	5.62	0
5.77	1	5.66	1	5.62	0	5.59	0
5.66	1	5.62	0	5.59	0	5.48	0
5.62	0	5.59	0	5.48	0	5.3	1
5.59	0	5.48	0	5.3	1	5.28	1
5.48	0	5.3	1	5.28	1	5.27	0
5.3	1	5.28	1	5.27	0	5.27	1
5.28	1	5.27	0	5.27	1	5.25	1
5.27	0	5.27	1	5.25	1	5.2	0
5.27	1	5.25	1	5.2	0	5.19	1
5.25	1	5.2	0	5.19	1	5.16	0
5.2	0	5.19	1	5.16	0	5.04	1
5.19	1	5.16	0	5.04	1	5.03	0
5.16	0	5.04	1	5.03	0	5.01	1
5.04	1	5.03	0	5.01	1	5.01	0
5.03	0	5.01	1	5.01	0	4.96	1
5.01	1	5.01	0	4.96	1	4.93	1
5.01	0	4.96	1	4.93	1	4.92	0
4.96	1	4.93	1	4.92	0	4.87	1
4.93	1	4.92	0	4.87	1	4.87	1
4.92	0	4.87	1	4.87	1	4.8	1
4.87	1	4.87	1	4.8	1	4.72	1
4.87	1	4.8	1	4.72	1	4.68	1
4.8	1	4.72	1	4.68	1	4.59	1
4.72	1	4.68	1	4.59	1	4.59	1
4.68	1	4.59	1	4.59	1	4.58	0
4.59	1	4.59	1	4.58	0	4.53	0
4.59	1	4.58	0	4.53	0	4.51	0

4.58	0	4.53	0	4.51	0	4.49	1
4.53	0	4.51	0	4.49	1	4.49	0
4.51	0	4.49	1	4.49	0	4.46	0
4.49	1	4.49	0	4.46	0	4.42	1
4.49	0	4.46	0	4.42	1	4.42	1
4.46	0	4.42	1	4.42	1	4.35	1
4.42	1	4.42	1	4.35	1	4.31	0
4.42	1	4.35	1	4.31	0	4.29	1
4.35	1	4.31	0	4.29	1	4.21	0
4.31	0	4.29	1	4.21	0	4.21	0
4.29	1	4.21	0	4.21	0	4.21	0
4.21	0	4.21	0	4.21	0	4.2	0
4.21	0	4.21	0	4.2	0	4.18	0
4.21	0	4.2	0	4.18	0	4.16	1
4.2	0	4.18	0	4.16	1	4.15	1
4.18	0	4.16	1	4.15	1	4.13	1
4.16	1	4.15	1	4.13	1	4.12	0
4.15	1	4.13	1	4.12	0	4.11	1
4.13	1	4.12	0	4.11	1	4.11	0
4.12	0	4.11	1	4.11	0	4.1	1
4.11	1	4.11	0	4.1	1	4.04	0
4.11	0	4.1	1	4.04	0	4.02	1
4.1	1	4.04	0	4.02	1	4	1
4.04	0	4.02	1	4	1	4	1
4.02	1	4	1	4	1	4	1
4	1	4	1	4	1	3.99	0
4	1	4	1	3.99	0	3.97	1
4	1	3.99	0	3.97	1	3.91	1
3.99	0	3.97	1	3.91	1	3.89	1
3.97	1	3.91	1	3.89	1	3.87	1
3.91	1	3.89	1	3.87	1	3.83	1
3.89	1	3.87	1	3.83	1	3.77	1
3.87	1	3.83	1	3.77	1	3.72	1
3.83	1	3.77	1	3.72	1	3.71	1
3.77	1	3.72	1	3.71	1	3.7	1
3.72	1	3.71	1	3.7	1	3.7	1
3.71	1	3.7	1	3.7	1	3.69	1
3.7	1	3.7	1	3.69	1	3.67	1
3.7	1	3.69	1	3.67	1	3.67	1
3.69	1	3.67	1	3.67	1	3.66	1
3.67	1	3.67	1	3.66	1	3.63	1
3.67	1	3.66	1	3.63	1	3.55	1
3.66	1	3.63	1	3.55	1	3.47	1
3.63	1	3.55	1	3.47	1	3.38	1
3.55	1	3.47	1	3.38	1	3.24	1
3.47	1	3.38	1	3.24	1	3.22	1
3.38	1	3.24	1	3.22	1	3.21	1
3.24	1	3.22	1	3.21	1	3.16	1
3.22	1	3.21	1	3.16	1	3	1
3.21	1	3.16	1	3	1	3	1
3.16	1	3	1	3	1	3	1
3	1	3	1	3	1	3	1
3	1	3	1	3	1	2.97	1
3	1	3	1	2.97	1	2.8	1
3	1	2.97	1	2.8	1	2.62	1
2.97	1	2.8	1	2.62	1	2.61	1
2.8	1	2.62	1	2.61	1	2.56	1
2.62	1	2.61	1	2.56	1	2.3	1
2.61	1	2.56	1	2.3	1	2.21	1
2.56	1	2.3	1	2.21	1	2.15	1
2.3	1	2.21	1	2.15	1	2	1
2.21	1	2.15	1	2	1		

2.15	1	2	1
2	1		

37, Arsenic, 0-3 Ft,	d_37, Arsenic, 0-3 Ft, mg/kg	29, Arsenic, 0-3 Ft,	d_29, Arsenic, 0-3 Ft, mg/kg	27, Arsenic, 0-3 Ft,	d_27, Arsenic, 0-3 Ft, mg/kg	25, Arsenic, 0-3 Ft,	d_25, Arsenic, 0-3 Ft, mg/kg
mg/kg		mg/kg		mg/kg		mg/kg	
37	1	29.3	1	27	1	25	1
29.3	1	27	1	25	1	24.6	1
27	1	25	1	24.6	1	24.1	1
25	1	24.6	1	24.1	1	23.8	1
24.6	1	24.1	1	23.8	1	21	1
24.1	1	23.8	1	21	1	20	1
23.8	1	21	1	20	1	19.6	1
21	1	20	1	19.6	1	18.4	1
20	1	19.6	1	18.4	1	15.8	1
19.6	1	18.4	1	15.8	1	14	1
18.4	1	15.8	1	14	1	13.9	1
15.8	1	14	1	13.9	1	12	1
14	1	13.9	1	12	1	11.6	1
13.9	1	12	1	11.6	1	11.1	1
12	1	11.6	1	11.1	1	8.43	1
11.6	1	11.1	1	8.43	1	7.73	1
11.1	1	8.43	1	7.73	1	7	1
8.43	1	7.73	1	7	1	6.72	1
7.73	1	7	1	6.72	1	6.7	1
7	1	6.72	1	6.7	1	6.42	1
6.72	1	6.7	1	6.42	1	6.27	1
6.7	1	6.42	1	6.27	1	6.26	0
6.42	1	6.27	1	6.26	0	6.21	1
6.27	1	6.26	0	6.21	1	6.17	1
6.26	0	6.21	1	6.17	1	5.77	1
6.21	1	6.17	1	5.77	1	5.77	1
6.17	1	5.77	1	5.77	1	5.66	1
5.77	1	5.77	1	5.66	1	5.62	0
5.77	1	5.66	1	5.62	0	5.59	0
5.66	1	5.62	0	5.59	0	5.48	0
5.62	0	5.59	0	5.48	0	5.3	1
5.59	0	5.48	0	5.3	1	5.28	1
5.48	0	5.3	1	5.28	1	5.27	0
5.3	1	5.28	1	5.27	0	5.27	1
5.28	1	5.27	0	5.27	1	5.25	1
5.27	0	5.27	1	5.25	1	5.2	0
5.27	1	5.25	1	5.2	0	5.19	1
5.25	1	5.2	0	5.19	1	5.16	0
5.2	0	5.19	1	5.16	0	5.04	1
5.19	1	5.16	0	5.04	1	5.03	0
5.16	0	5.04	1	5.03	0	5.01	1
5.04	1	5.03	0	5.01	1	5.01	0
5.03	0	5.01	1	5.01	0	4.96	1
5.01	1	5.01	0	4.96	1	4.93	1
5.01	0	4.96	1	4.93	1	4.92	0
4.96	1	4.93	1	4.92	0	4.87	1
4.93	1	4.92	0	4.87	1	4.87	1
4.92	0	4.87	1	4.87	1	4.8	1
4.87	1	4.87	1	4.8	1	4.72	1
4.87	1	4.8	1	4.72	1	4.68	1
4.8	1	4.72	1	4.68	1	4.59	1
4.72	1	4.68	1	4.59	1	4.59	1
4.68	1	4.59	1	4.59	1	4.58	0
4.59	1	4.59	1	4.58	0	4.53	0
4.59	1	4.58	0	4.53	0	4.51	0
4.58	0	4.53	0	4.51	0	4.49	1
4.53	0	4.51	0	4.49	1	4.49	0
4.51	0	4.49	1	4.49	0	4.46	0
4.49	1	4.49	0	4.46	0	4.42	1

4.49	0	4.46	0	4.42	1	4.42	1
4.46	0	4.42	1	4.42	1	4.35	1
4.42	1	4.42	1	4.35	1	4.31	0
4.42	1	4.35	1	4.31	0	4.29	1
4.35	1	4.31	0	4.29	1	4.21	0
4.31	0	4.29	1	4.21	0	4.21	0
4.29	1	4.21	0	4.21	0	4.21	0
4.21	0	4.21	0	4.21	0	4.2	0
4.21	0	4.21	0	4.2	0	4.18	0
4.21	0	4.2	0	4.18	0	4.16	1
4.2	0	4.18	0	4.16	1	4.15	1
4.18	0	4.16	1	4.15	1	4.13	1
4.16	1	4.15	1	4.13	1	4.12	0
4.15	1	4.13	1	4.12	0	4.11	1
4.13	1	4.12	0	4.11	1	4.11	0
4.12	0	4.11	1	4.11	0	4.1	1
4.11	1	4.11	0	4.1	1	4.04	0
4.11	0	4.1	1	4.04	0	4.02	1
4.1	1	4.04	0	4.02	1	4	1
4.04	0	4.02	1	4	1	4	1
4.02	1	4	1	4	1	4	1
4	1	4	1	4	1	3.99	0
4	1	4	1	3.99	0	3.97	1
4	1	3.99	0	3.97	1	3.91	1
3.99	0	3.97	1	3.91	1	3.89	1
3.97	1	3.91	1	3.89	1	3.87	1
3.91	1	3.89	1	3.87	1	3.83	1
3.89	1	3.87	1	3.83	1	3.77	1
3.87	1	3.83	1	3.77	1	3.72	1
3.83	1	3.77	1	3.72	1	3.71	1
3.77	1	3.72	1	3.71	1	3.7	1
3.72	1	3.71	1	3.7	1	3.7	1
3.71	1	3.7	1	3.7	1	3.69	1
3.7	1	3.7	1	3.69	1	3.67	1
3.7	1	3.69	1	3.67	1	3.67	1
3.69	1	3.67	1	3.67	1	3.66	1
3.67	1	3.67	1	3.66	1	3.63	1
3.67	1	3.66	1	3.63	1	3.55	1
3.66	1	3.63	1	3.55	1	3.47	1
3.63	1	3.55	1	3.47	1	3.38	1
3.55	1	3.47	1	3.38	1	3.24	1
3.47	1	3.38	1	3.24	1	3.22	1
3.38	1	3.24	1	3.22	1	3.21	1
3.24	1	3.22	1	3.21	1	3.16	1
3.22	1	3.21	1	3.16	1	3	1
3.21	1	3.16	1	3	1	3	1
3.16	1	3	1	3	1	3	1
3	1	3	1	3	1	3	1
3	1	3	1	3	1	2.97	1
3	1	3	1	2.97	1	2.8	1
3	1	2.97	1	2.8	1	2.62	1
2.97	1	2.8	1	2.62	1	2.61	1
2.8	1	2.62	1	2.61	1	2.56	1
2.62	1	2.61	1	2.56	1	2.3	1
2.61	1	2.56	1	2.3	1	2.21	1
2.56	1	2.3	1	2.21	1	2.15	1
2.3	1	2.21	1	2.15	1	2	1
2.21	1	2.15	1	2	1		
2.15	1	2	1				
2	1						

24.6, Arsenic, 0-3 Ft, mg/kg	d_24.6, Arsenic, 0-3 Ft, mg/kg	24, Arsenic, 0-3 Ft, mg/kg	d_24, Arsenic, 0-3 Ft, mg/kg
24.6	1	24.1	1
24.1	1	23.8	1
23.8	1	21	1
21	1	20	1
20	1	19.6	1
19.6	1	18.4	1
18.4	1	15.8	1
15.8	1	14	1
14	1	13.9	1
13.9	1	12	1
12	1	11.6	1
11.6	1	11.1	1
11.1	1	8.43	1
8.43	1	7.73	1
7.73	1	7	1
7	1	6.72	1
6.72	1	6.7	1
6.7	1	6.42	1
6.42	1	6.27	1
6.27	1	6.26	0
6.26	0	6.21	1
6.21	1	6.17	1
6.17	1	5.77	1
5.77	1	5.77	1
5.77	1	5.66	1
5.66	1	5.62	0
5.62	0	5.59	0
5.59	0	5.48	0
5.48	0	5.3	1
5.3	1	5.28	1
5.28	1	5.27	0
5.27	0	5.27	1
5.27	1	5.25	1
5.25	1	5.2	0
5.2	0	5.19	1
5.19	1	5.16	0
5.16	0	5.04	1
5.04	1	5.03	0
5.03	0	5.01	1
5.01	1	5.01	0
5.01	0	4.96	1
4.96	1	4.93	1
4.93	1	4.92	0
4.92	0	4.87	1
4.87	1	4.87	1
4.87	1	4.8	1
4.8	1	4.72	1
4.72	1	4.68	1
4.68	1	4.59	1
4.59	1	4.59	1
4.59	1	4.58	0
4.58	0	4.53	0
4.53	0	4.51	0
4.51	0	4.49	1
4.49	1	4.49	0
4.49	0	4.46	0
4.46	0	4.42	1
4.42	1	4.42	1
4.42	1	4.35	1

4.35	1	4.31	0
4.31	0	4.29	1
4.29	1	4.21	0
4.21	0	4.21	0
4.21	0	4.21	0
4.21	0	4.2	0
4.2	0	4.18	0
4.18	0	4.16	1
4.16	1	4.15	1
4.15	1	4.13	1
4.13	1	4.12	0
4.12	0	4.11	1
4.11	1	4.11	0
4.11	0	4.1	1
4.1	1	4.04	0
4.04	0	4.02	1
4.02	1	4	1
4	1	4	1
4	1	4	1
4	1	3.99	0
3.99	0	3.97	1
3.97	1	3.91	1
3.91	1	3.89	1
3.89	1	3.87	1
3.87	1	3.83	1
3.83	1	3.77	1
3.77	1	3.72	1
3.72	1	3.71	1
3.71	1	3.7	1
3.7	1	3.7	1
3.7	1	3.69	1
3.69	1	3.67	1
3.67	1	3.67	1
3.67	1	3.66	1
3.66	1	3.63	1
3.63	1	3.55	1
3.55	1	3.47	1
3.47	1	3.38	1
3.38	1	3.24	1
3.24	1	3.22	1
3.22	1	3.21	1
3.21	1	3.16	1
3.16	1	3	1
3	1	3	1
3	1	3	1
3	1	3	1
3	1	2.97	1
2.97	1	2.8	1
2.8	1	2.62	1
2.62	1	2.61	1
2.61	1	2.56	1
2.56	1	2.3	1
2.3	1	2.21	1
2.21	1	2.15	1
2.15	1	2	1
2	1		